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**Lim et al.**

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(54) **HITTING GAME MACHINE ALLOWING SUCCESSIVE INPUT OF COINS**

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***A63F 7/00*** (2006.01)
***G07F 17/32*** (2006.01)

(52) **U.S. Cl.**
CPC ..... ***G07F 17/3202*** (2013.01); ***G07F 17/3216*** (2013.01); *G07F 17/3297* (2013.01)

(58) **Field of Classification Search**
CPC ..... A63F 7/02; A63F 7/30
USPC ..... 273/126, 126 A, 127 D, 138.1–138.3
See application file for complete search history.

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(57) **ABSTRACT**

A hitting game machine allows the successive input of coins. In the hitting game machine, each target which is to be rotated by a hit of a hitting member includes an eccentric shaft. The target is configured such that a rotating shaft integrally rotates along with a hit surface which is to be hit by the hitting member. Further, a longitudinal section of the hit surface has a plate shape, a longitudinal section of which is in a linear shape or a shape that is reduced in width from an upper end thereof to a lower end. Therefore, it is possible for several hitting members to successively hit the same one of targets of a circular plate that is rotating.

**13 Claims, 15 Drawing Sheets**

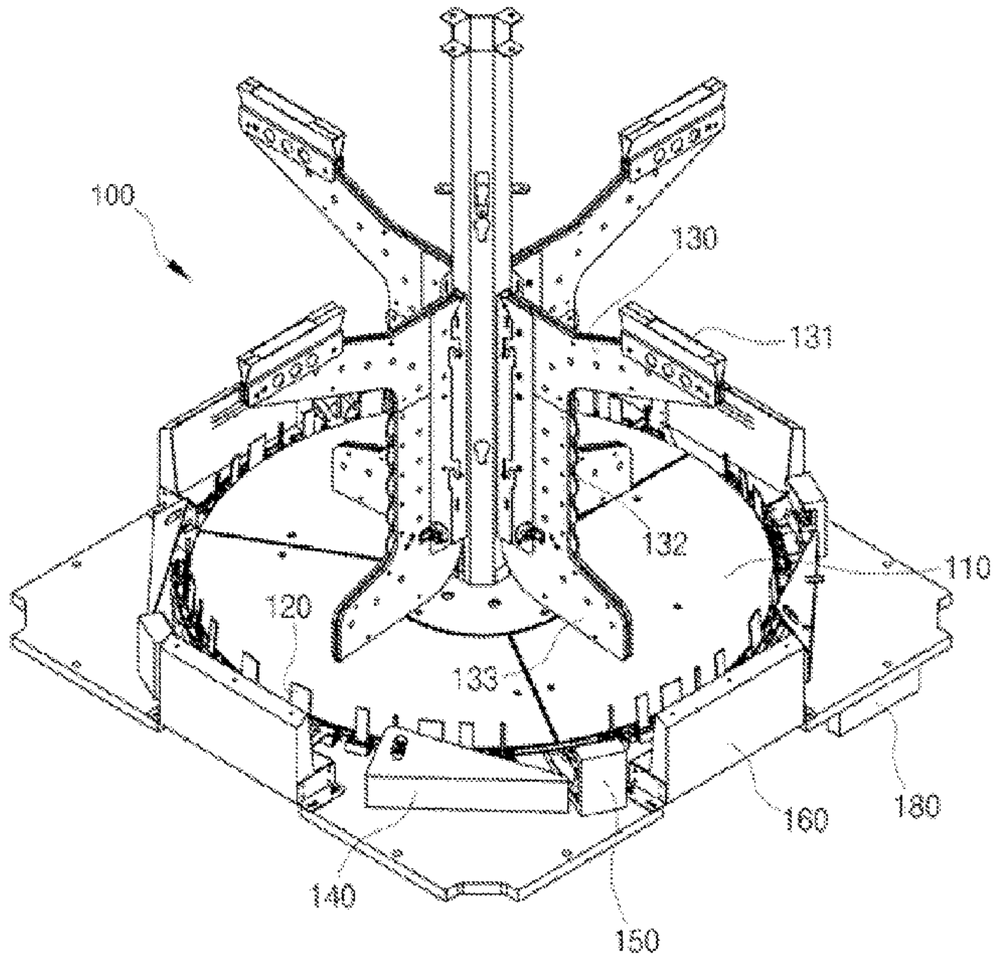
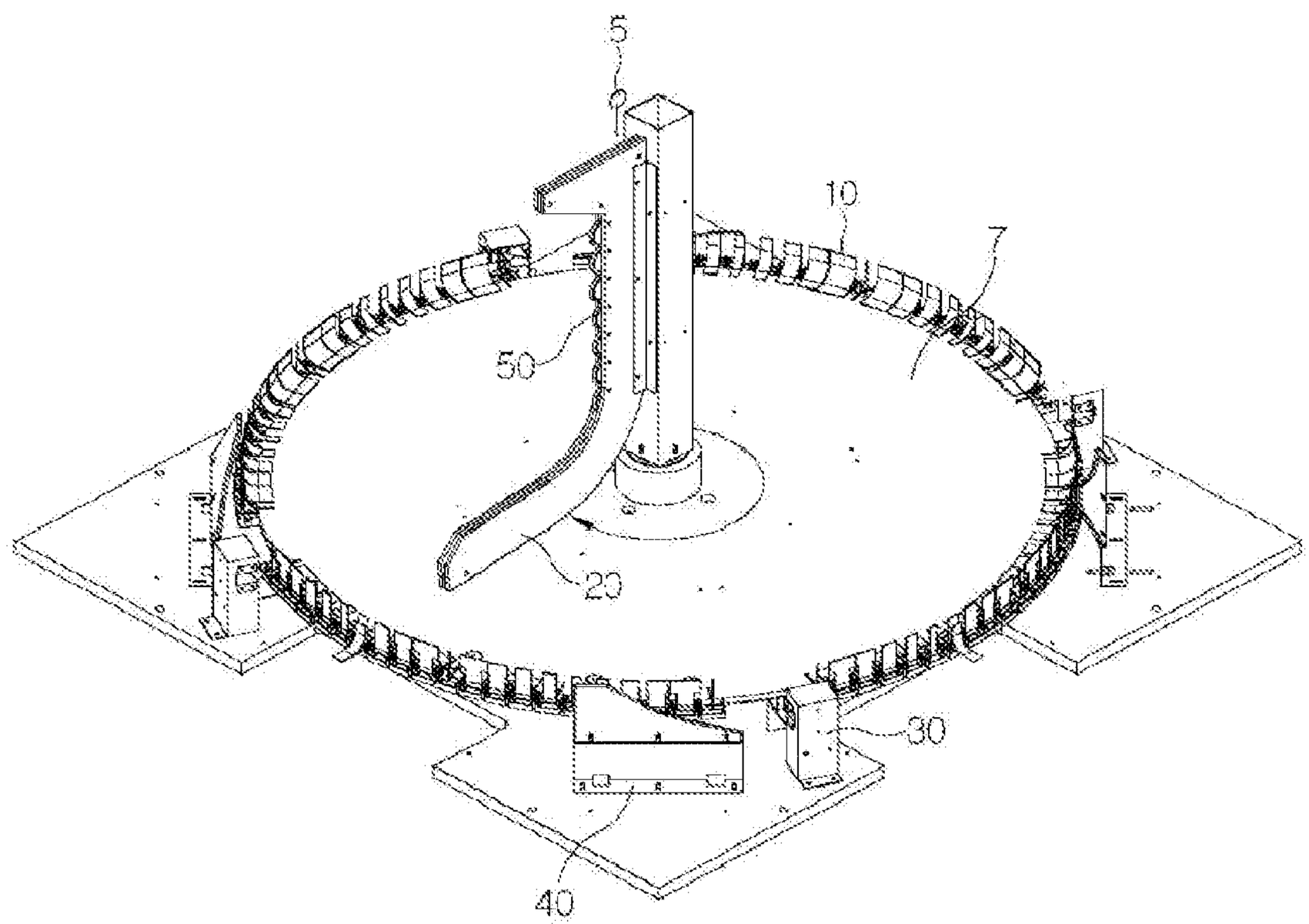
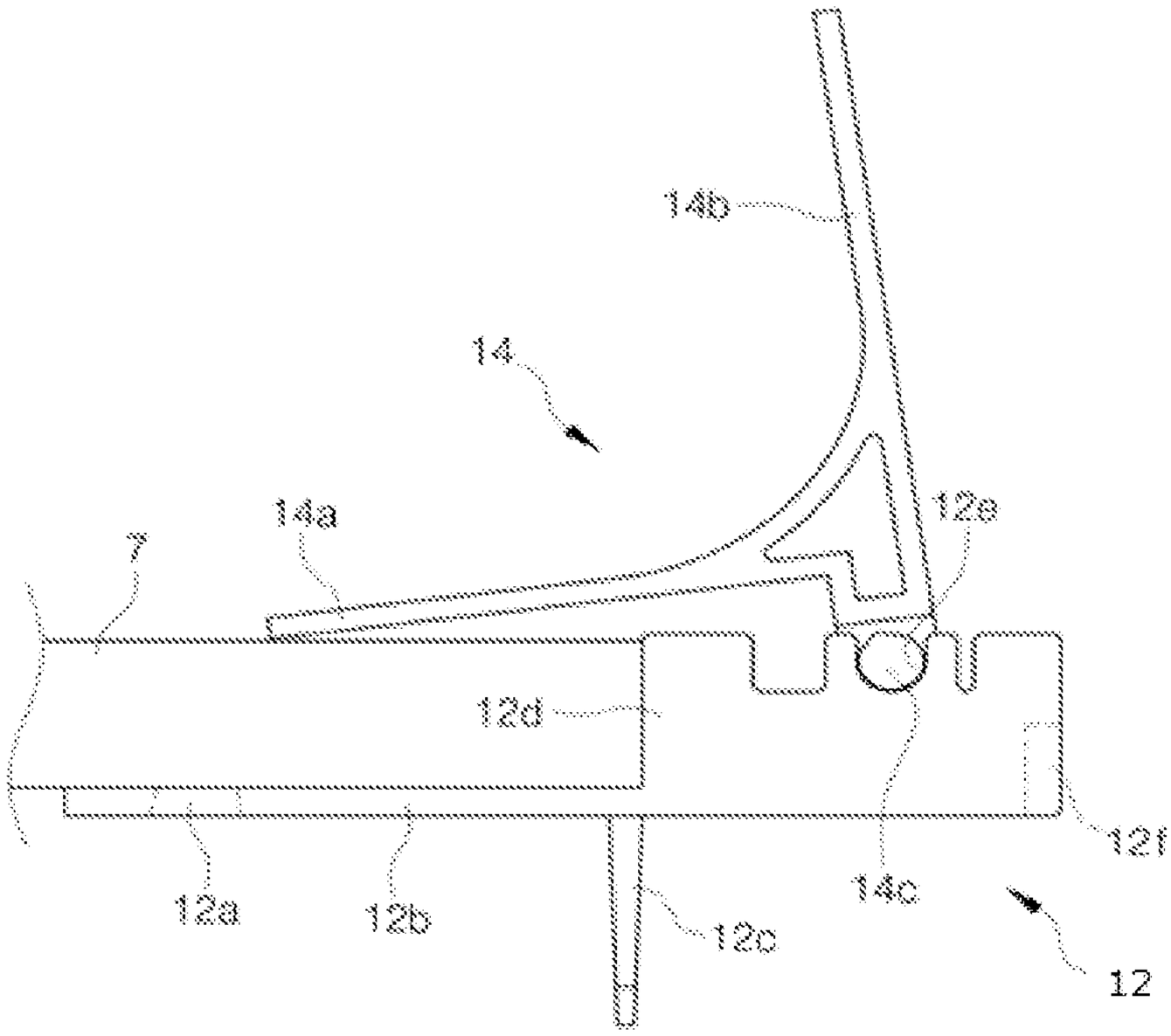


FIG. 1



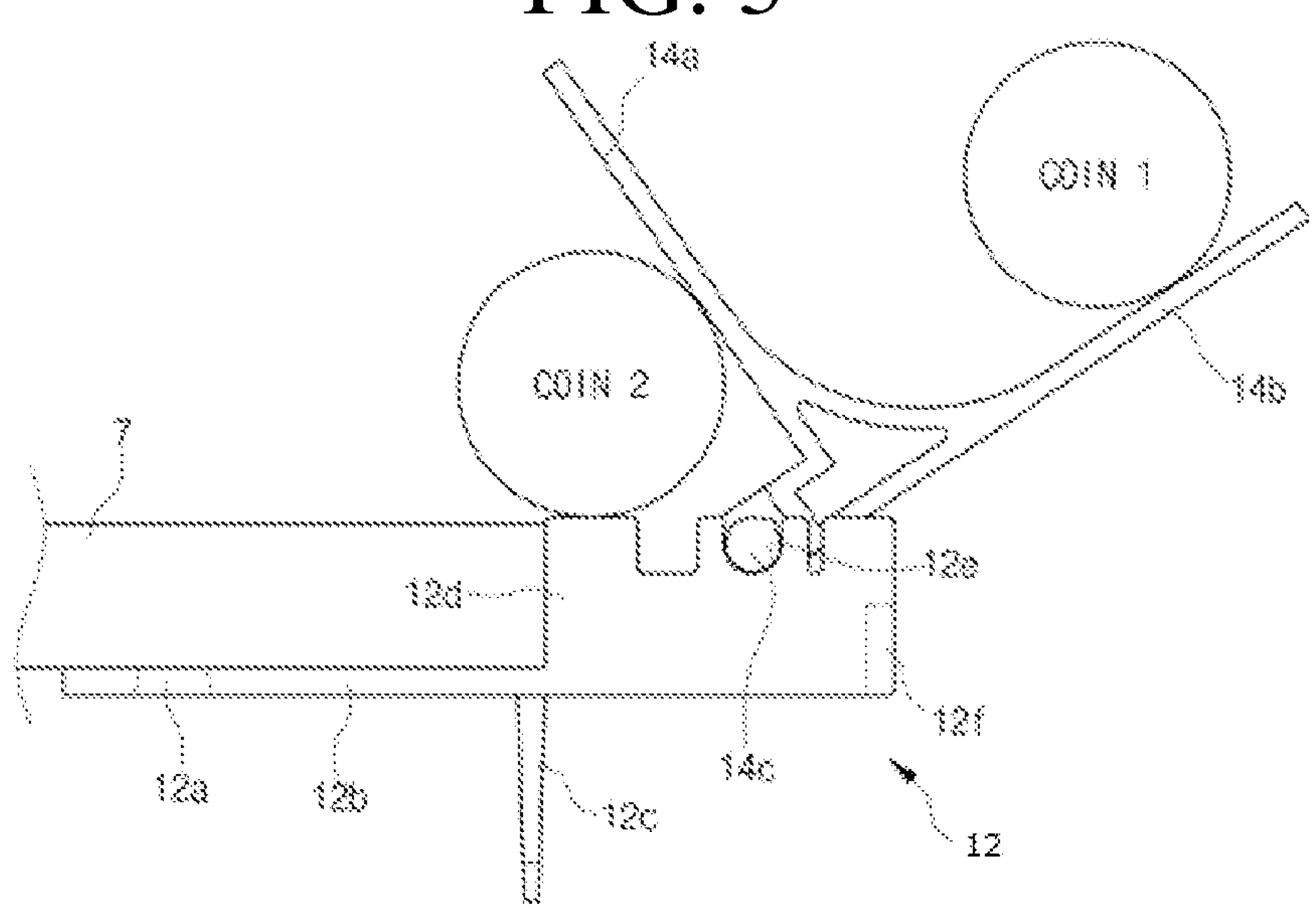

PRIOR ART

FIG. 2



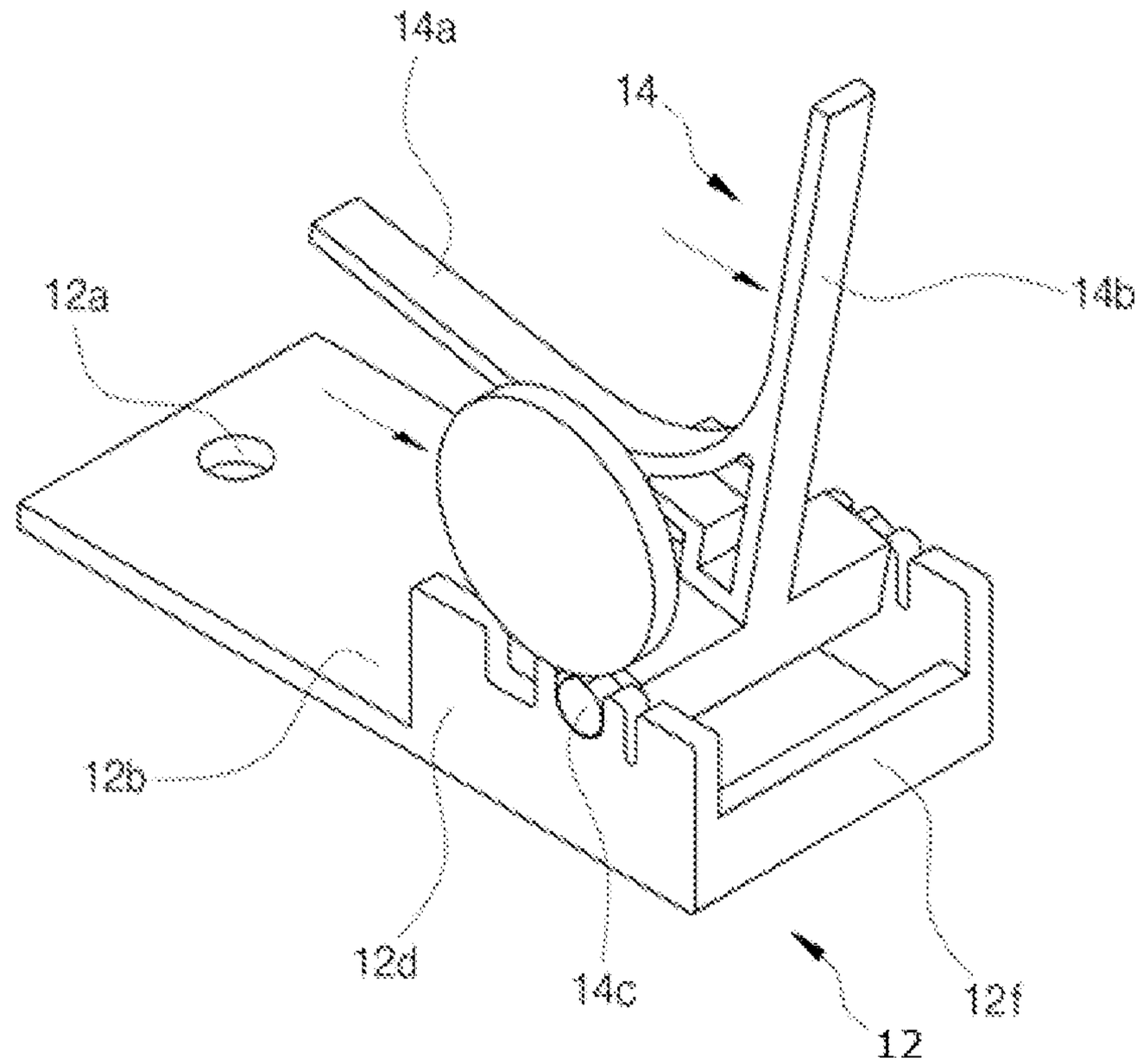

PRIOR ART

FIG. 3




PRIOR ART

FIG. 4




PRIOR ART

FIG. 5

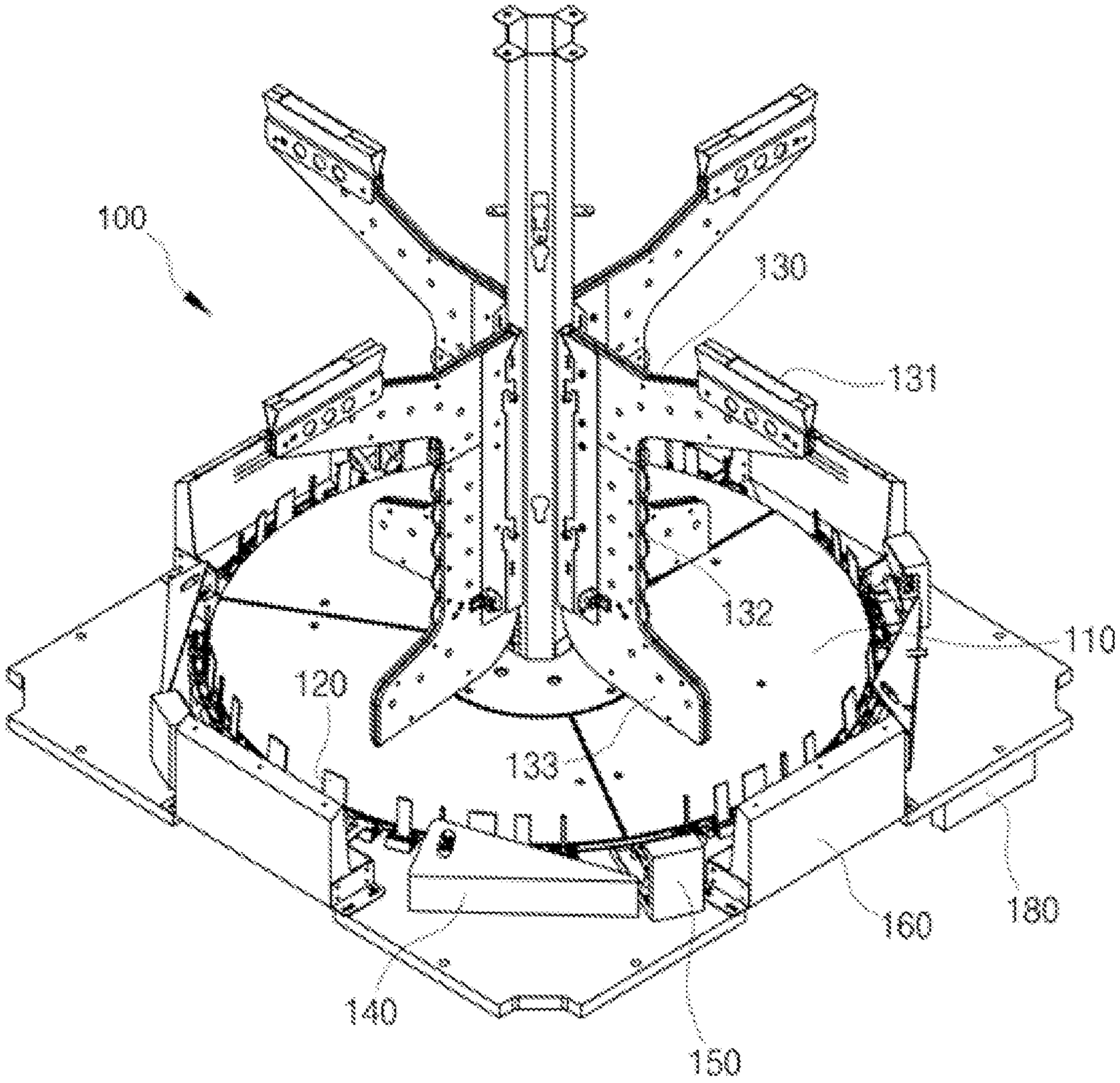


FIG. 6

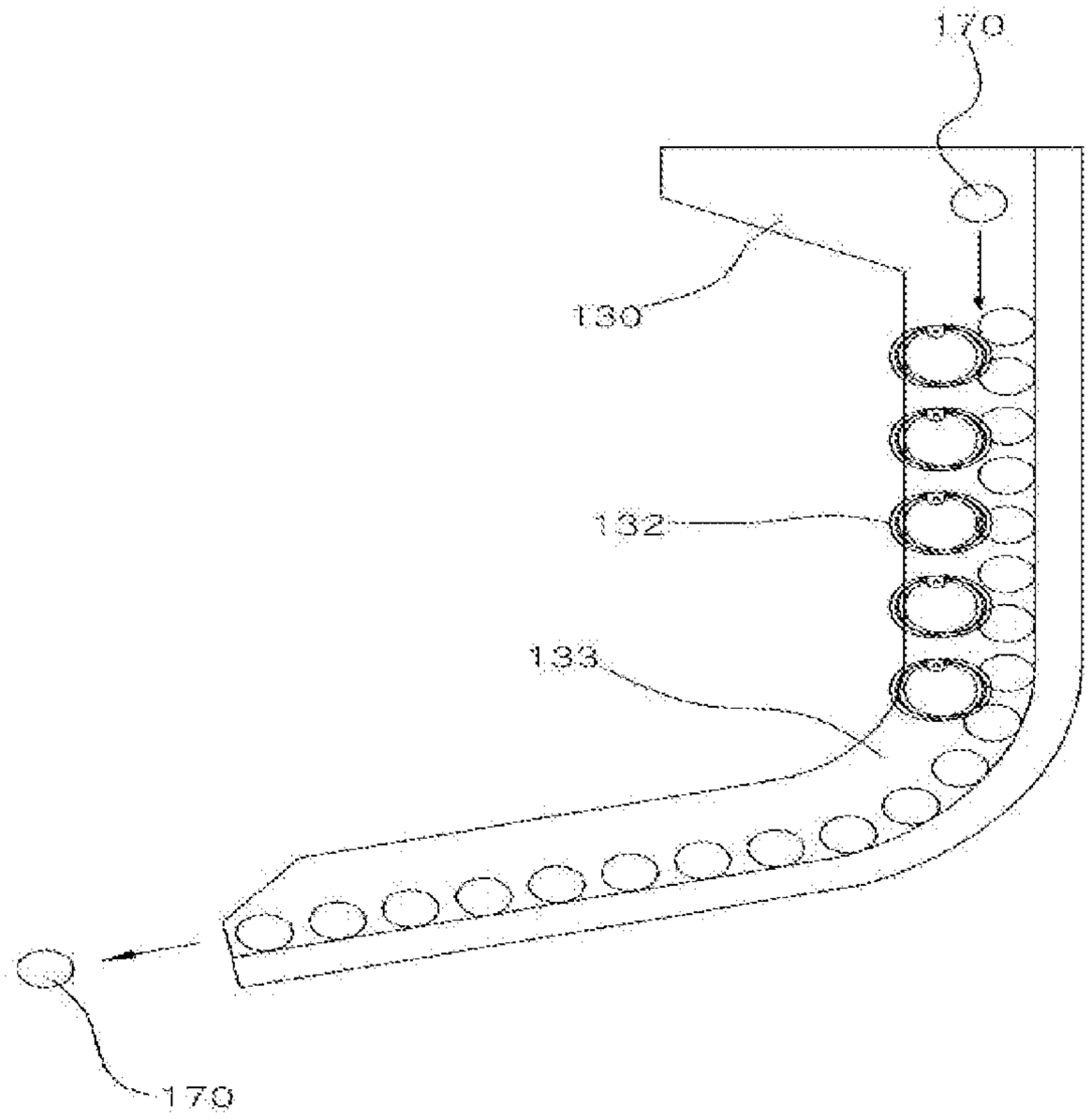



FIG. 7

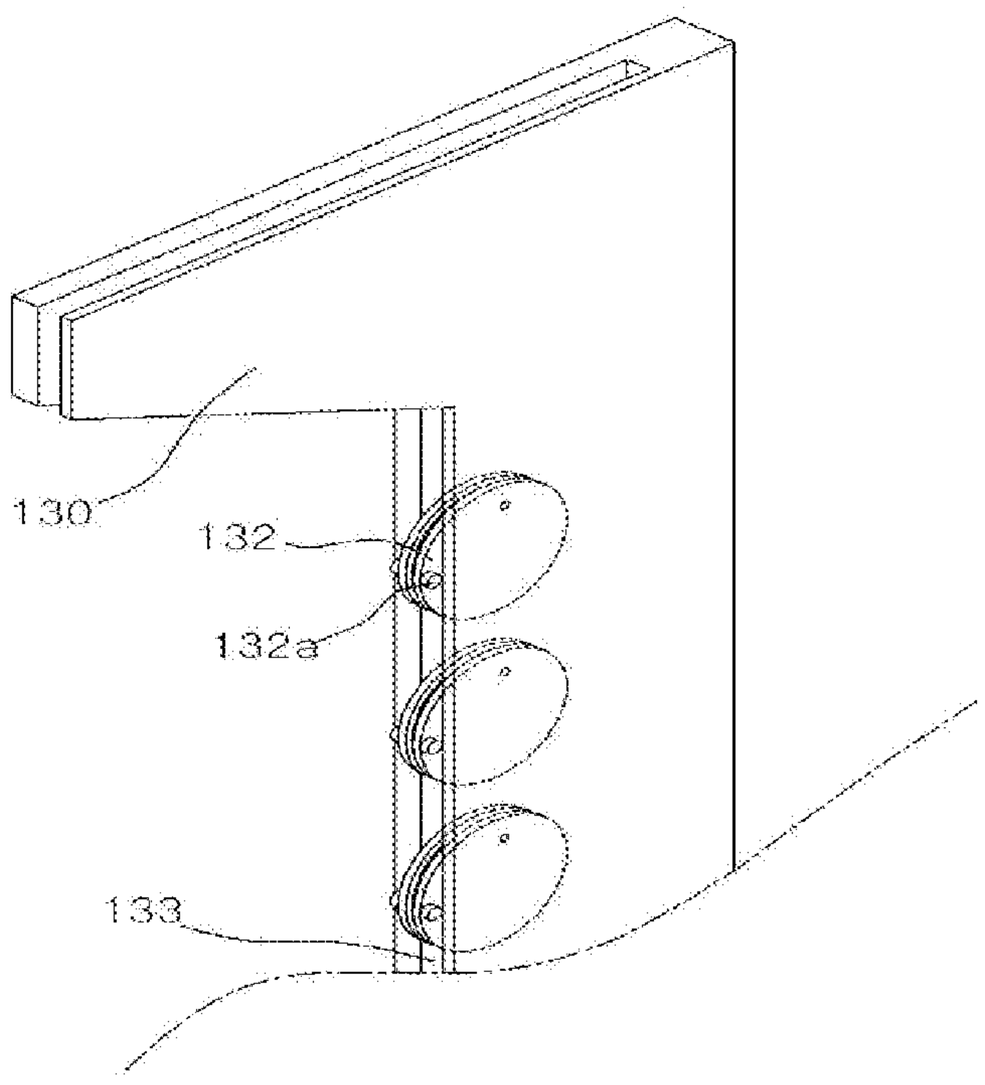


FIG. 8

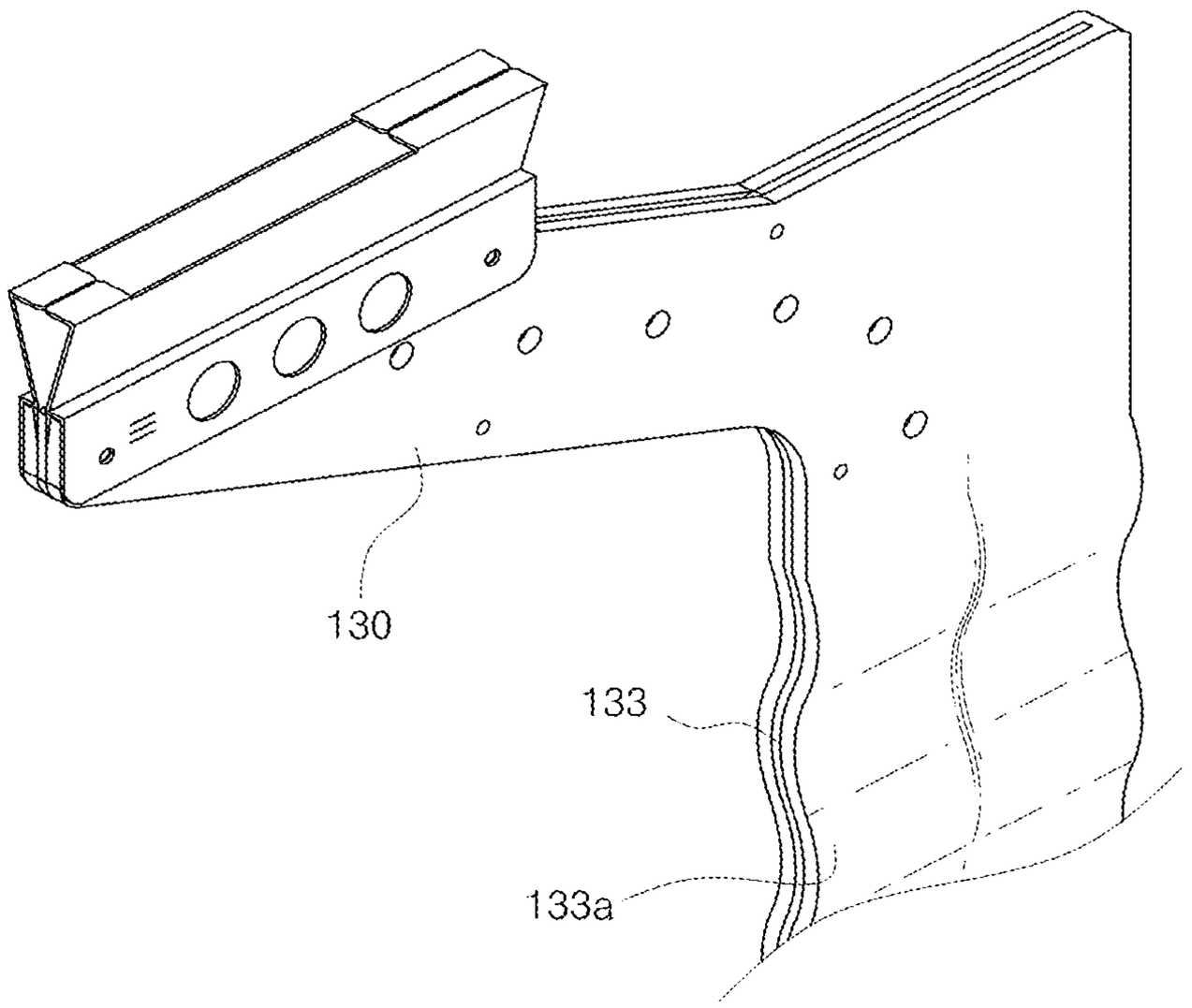



FIG. 9

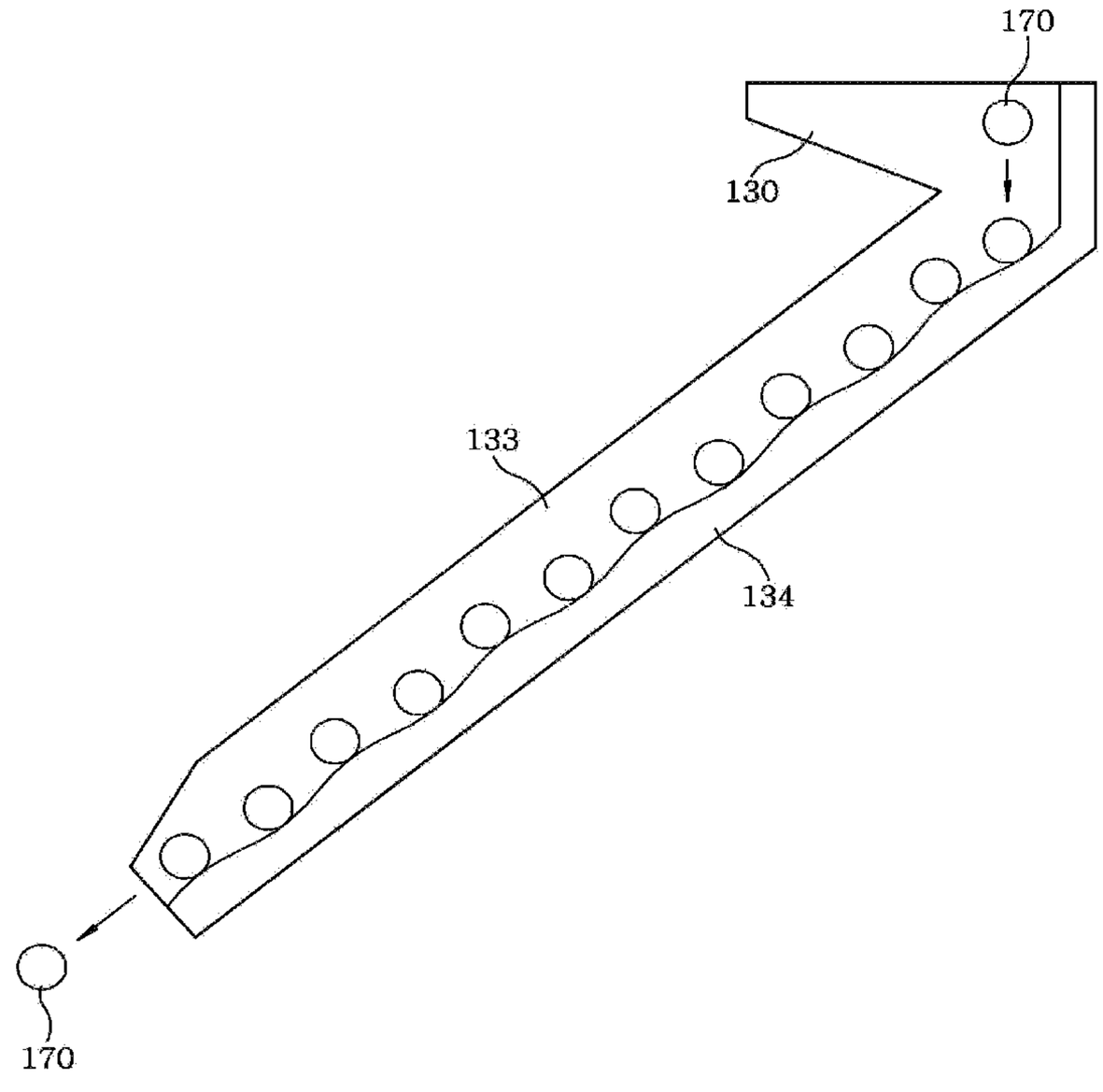


FIG. 10

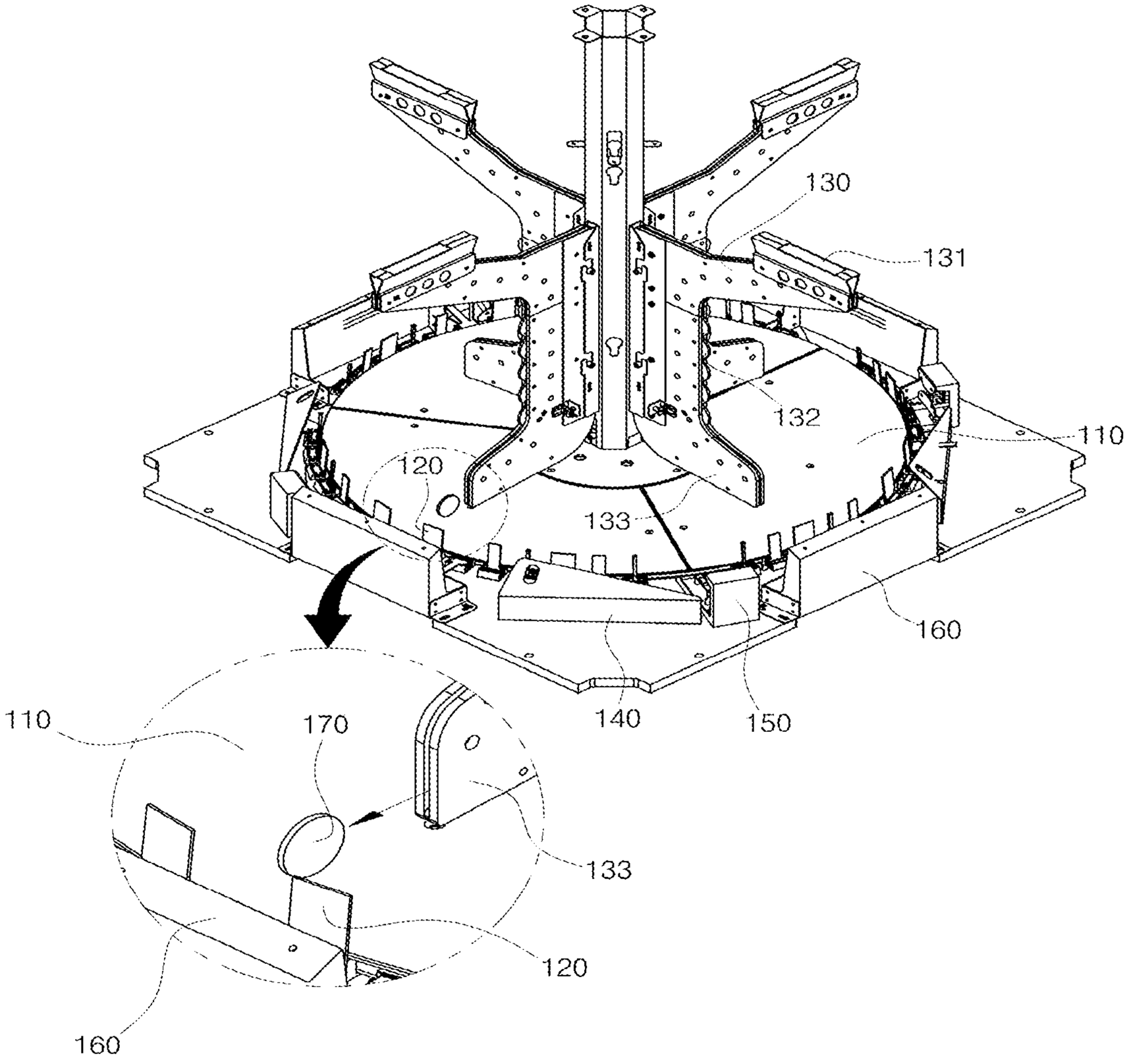


FIG. 11

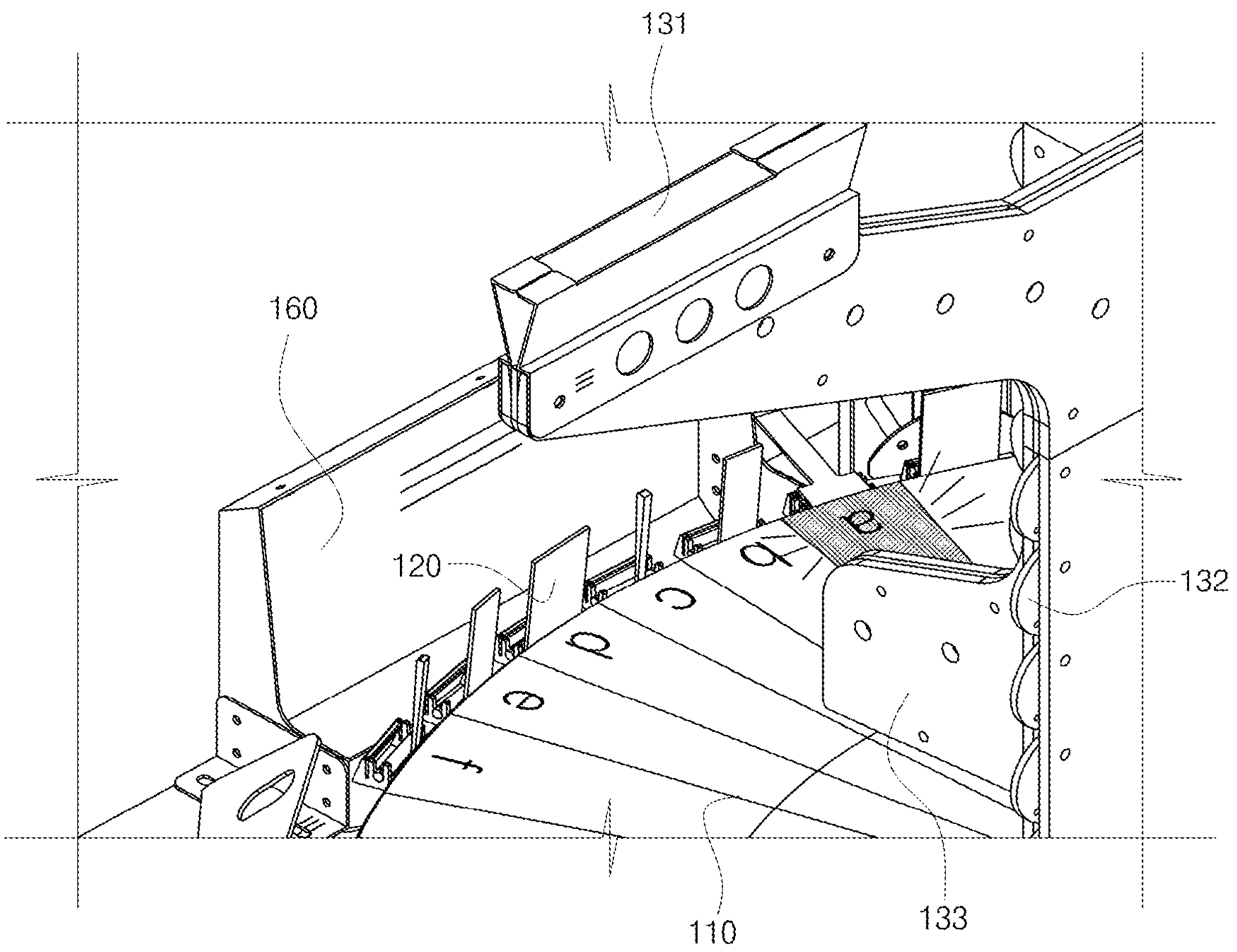


FIG. 12

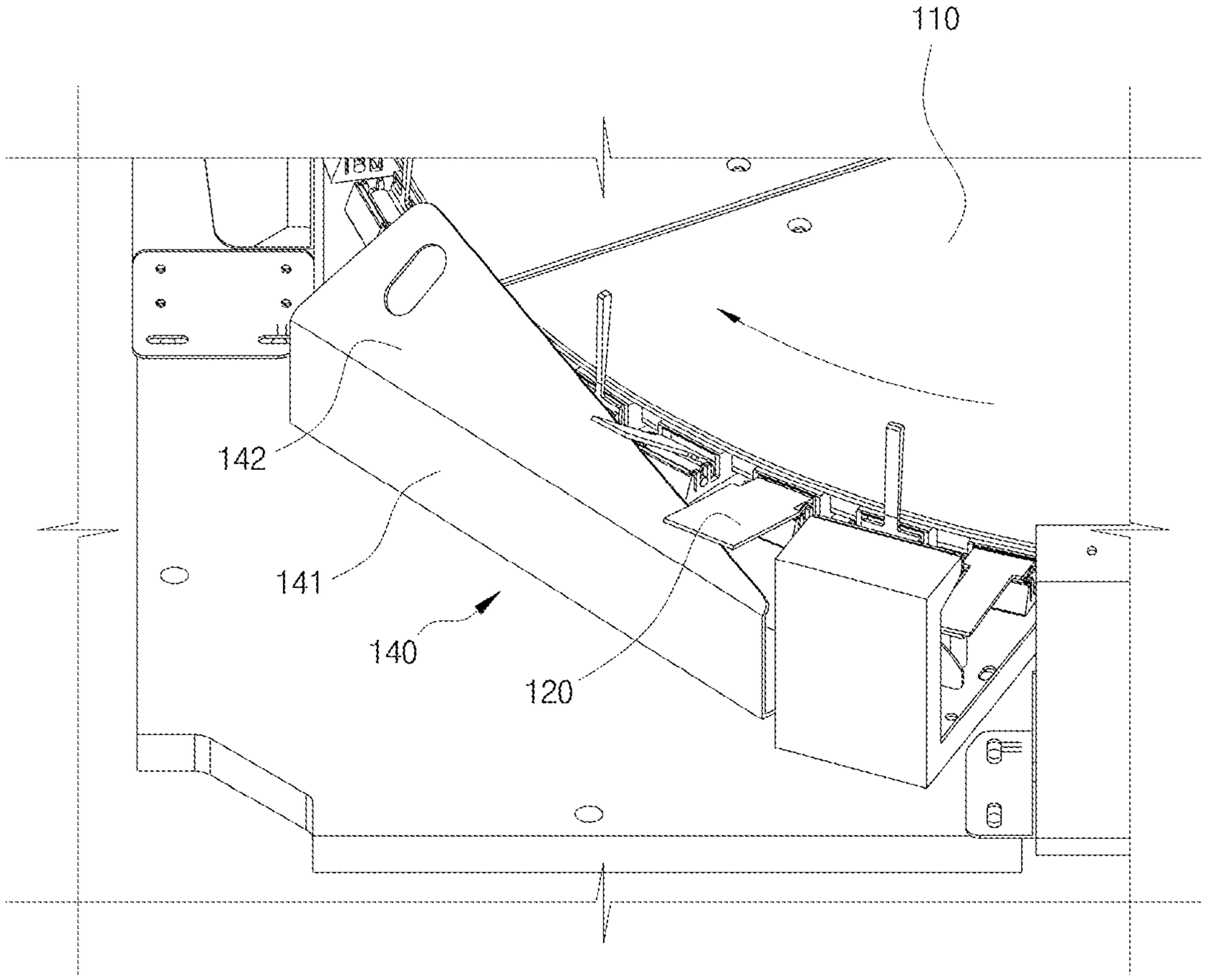



FIG. 13

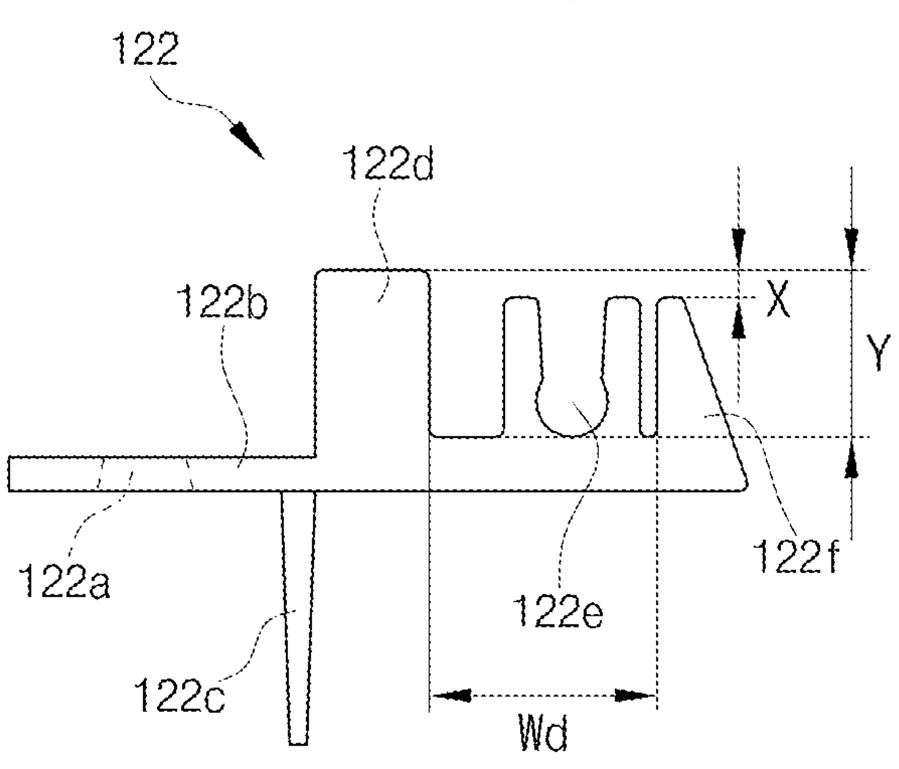
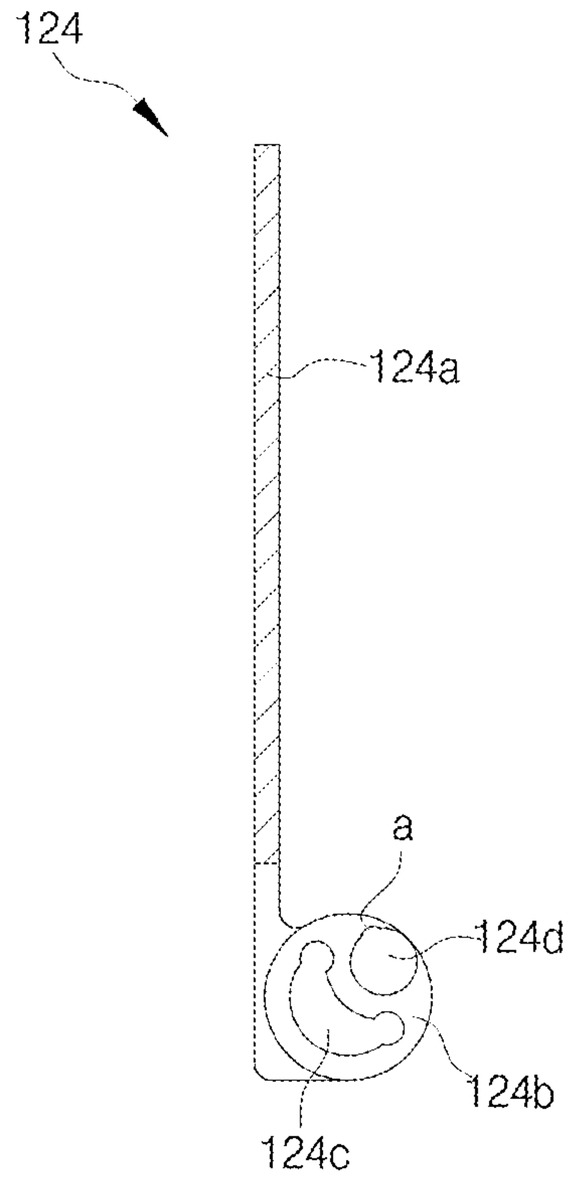


FIG. 14


124
124a
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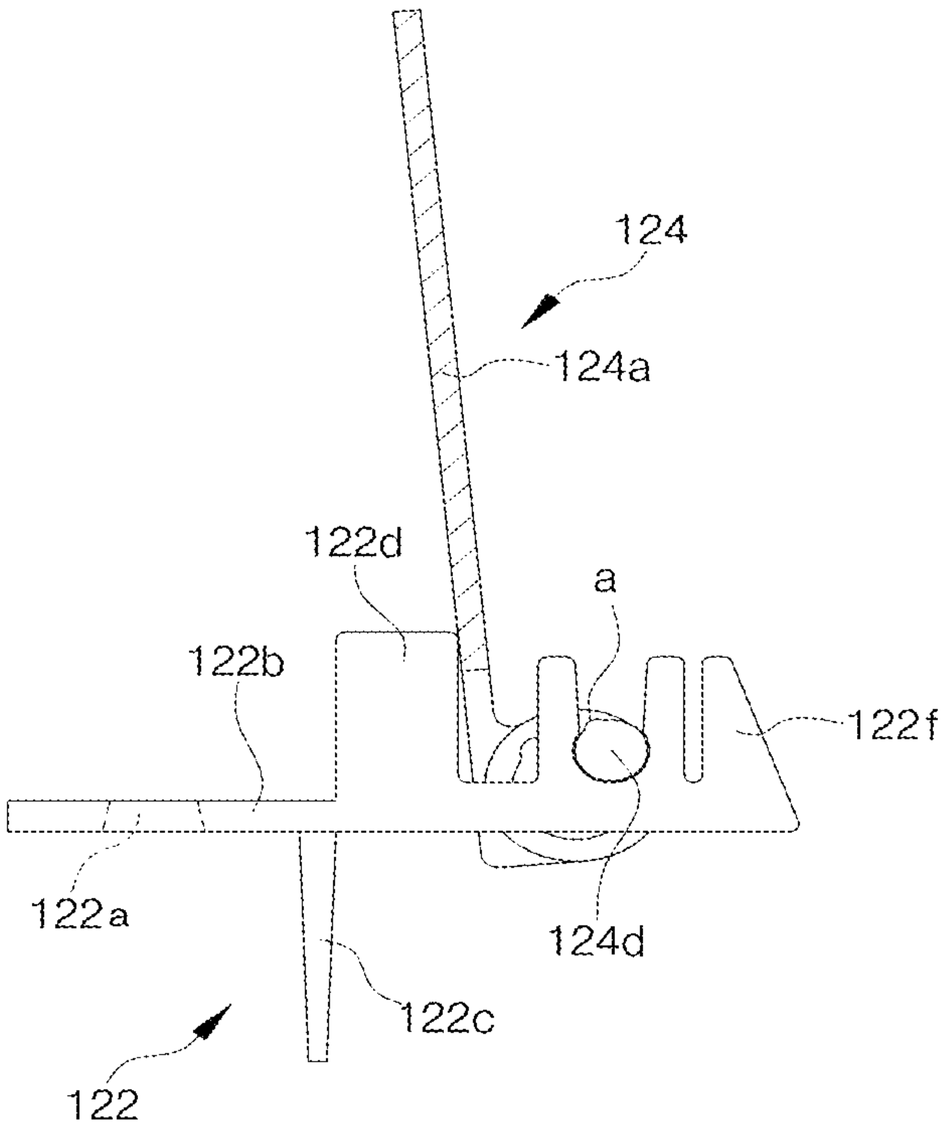
124d
124b
124c

FIG. 15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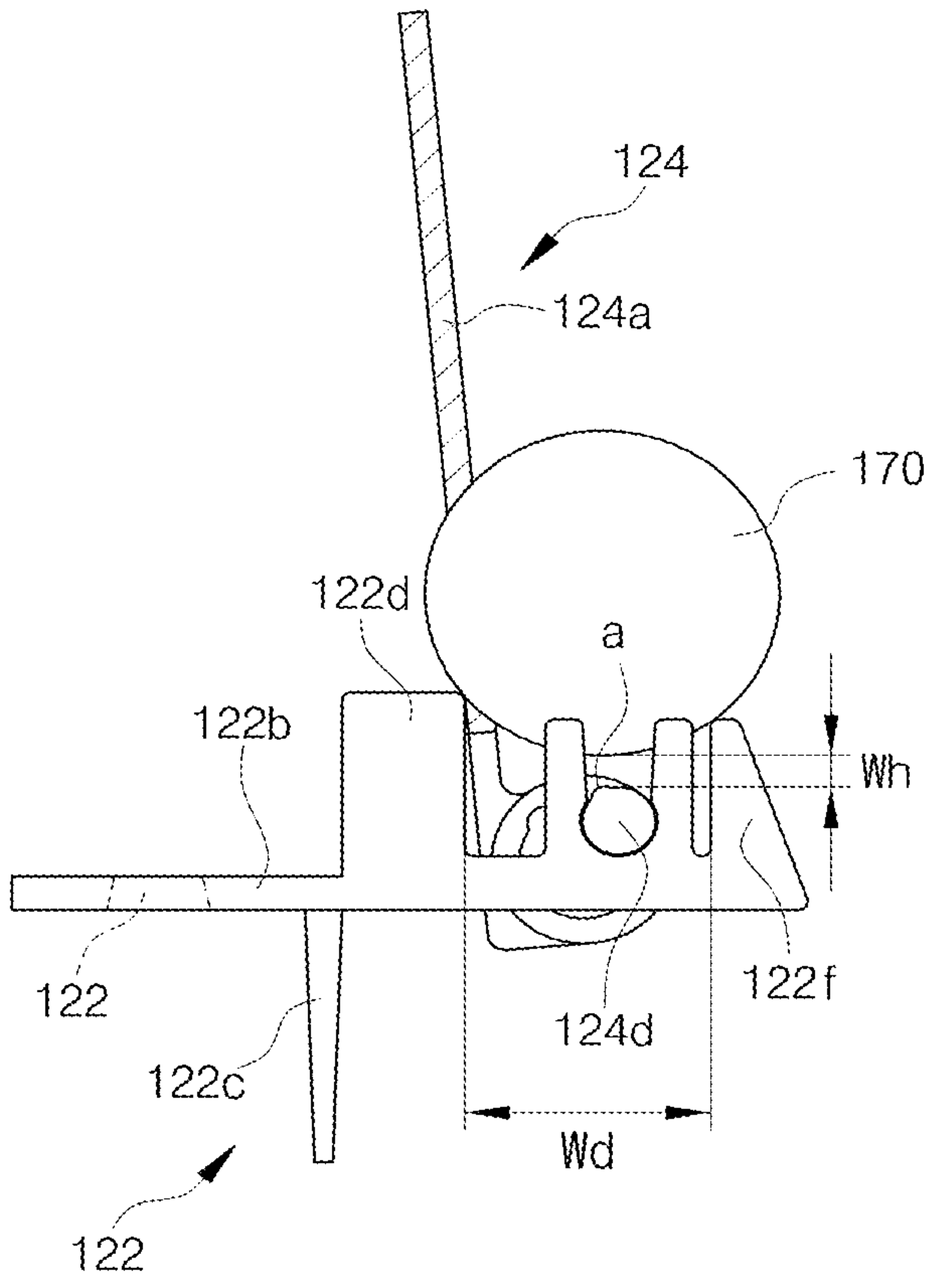
122c
122

FIG. 16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122d
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122b
Wh
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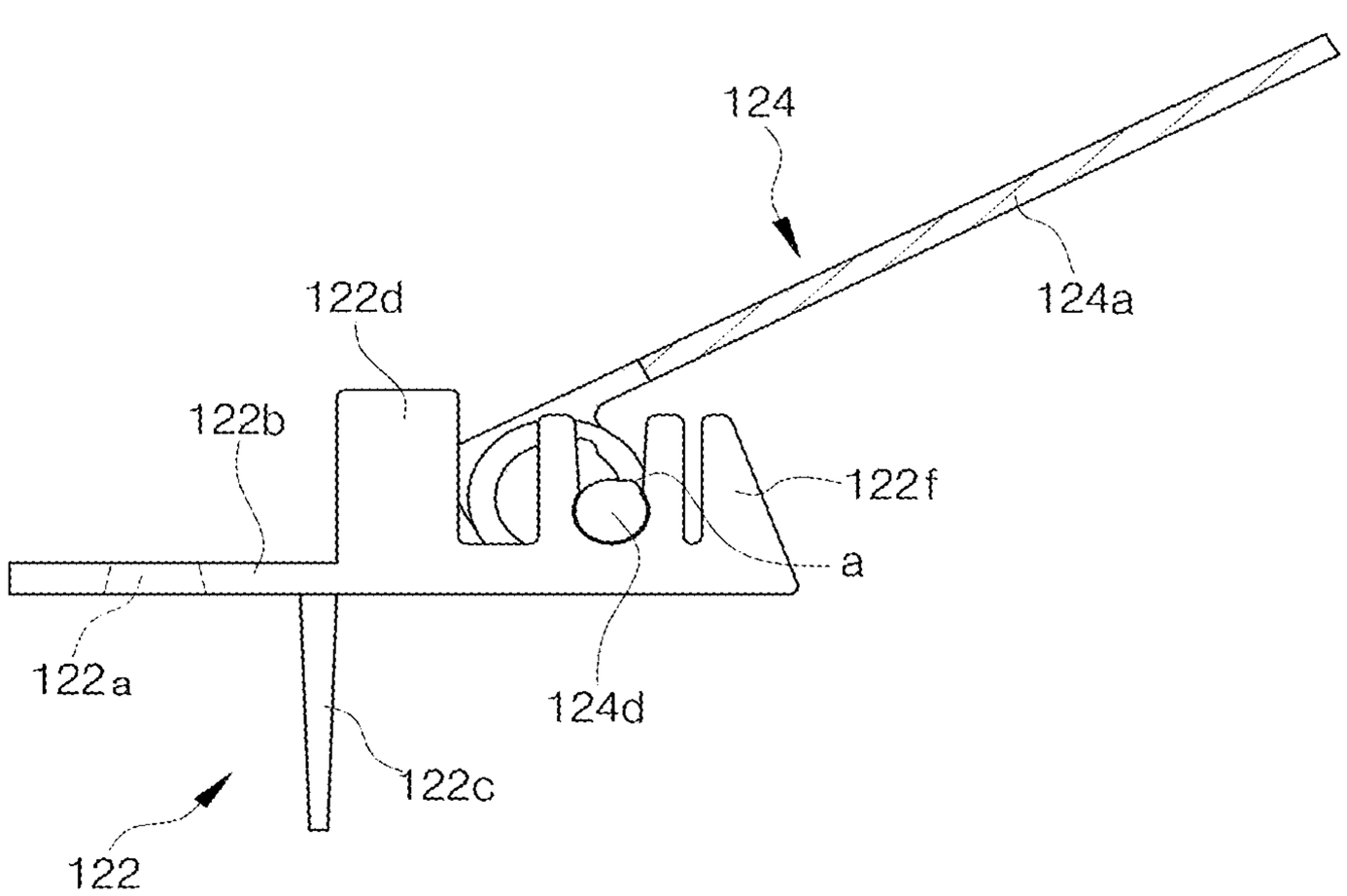
122c
124d
122f
Wd
122

FIG. 17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122b
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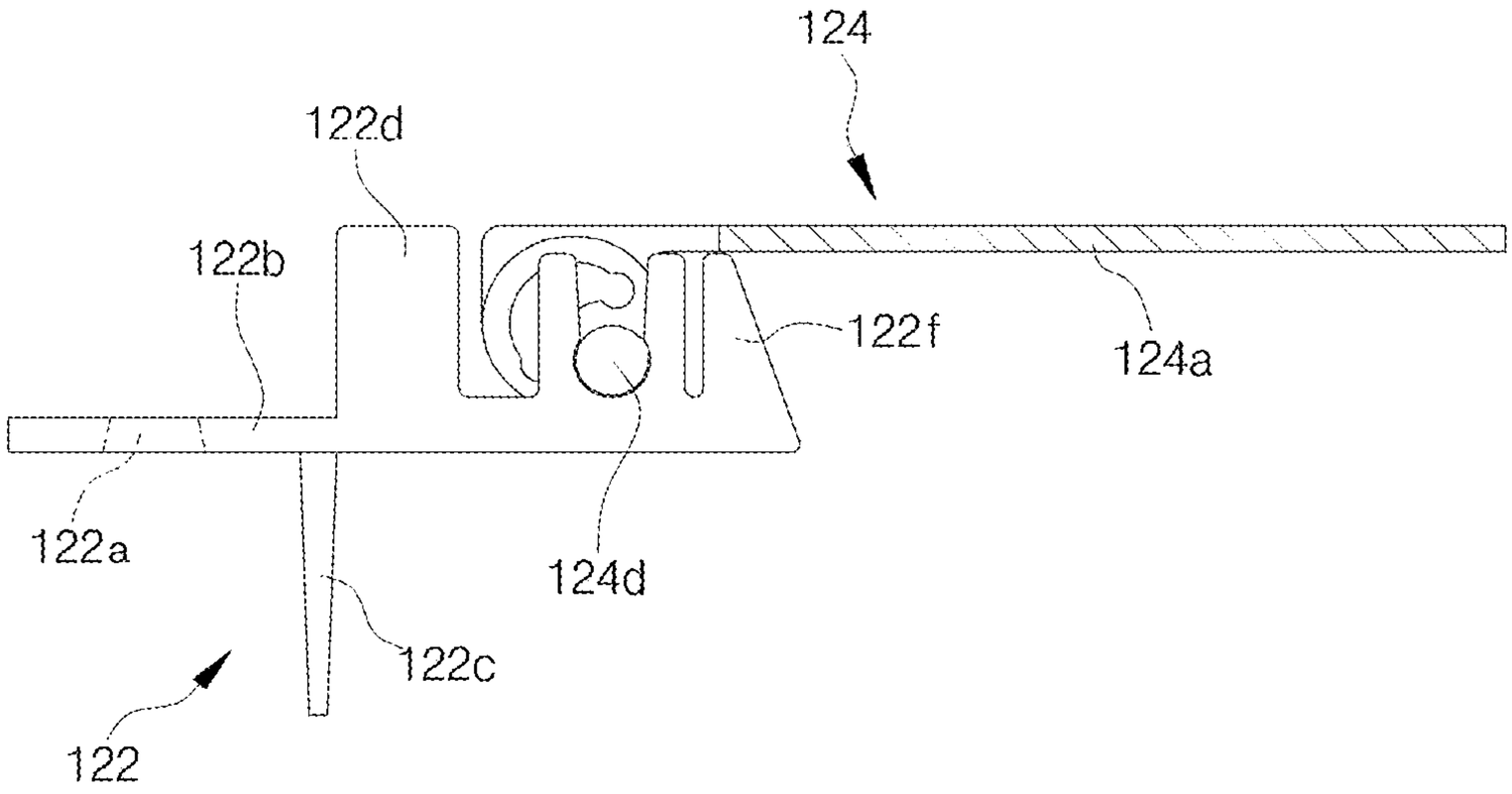
122a
124d
122c
122

FIG. 18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124d
122c
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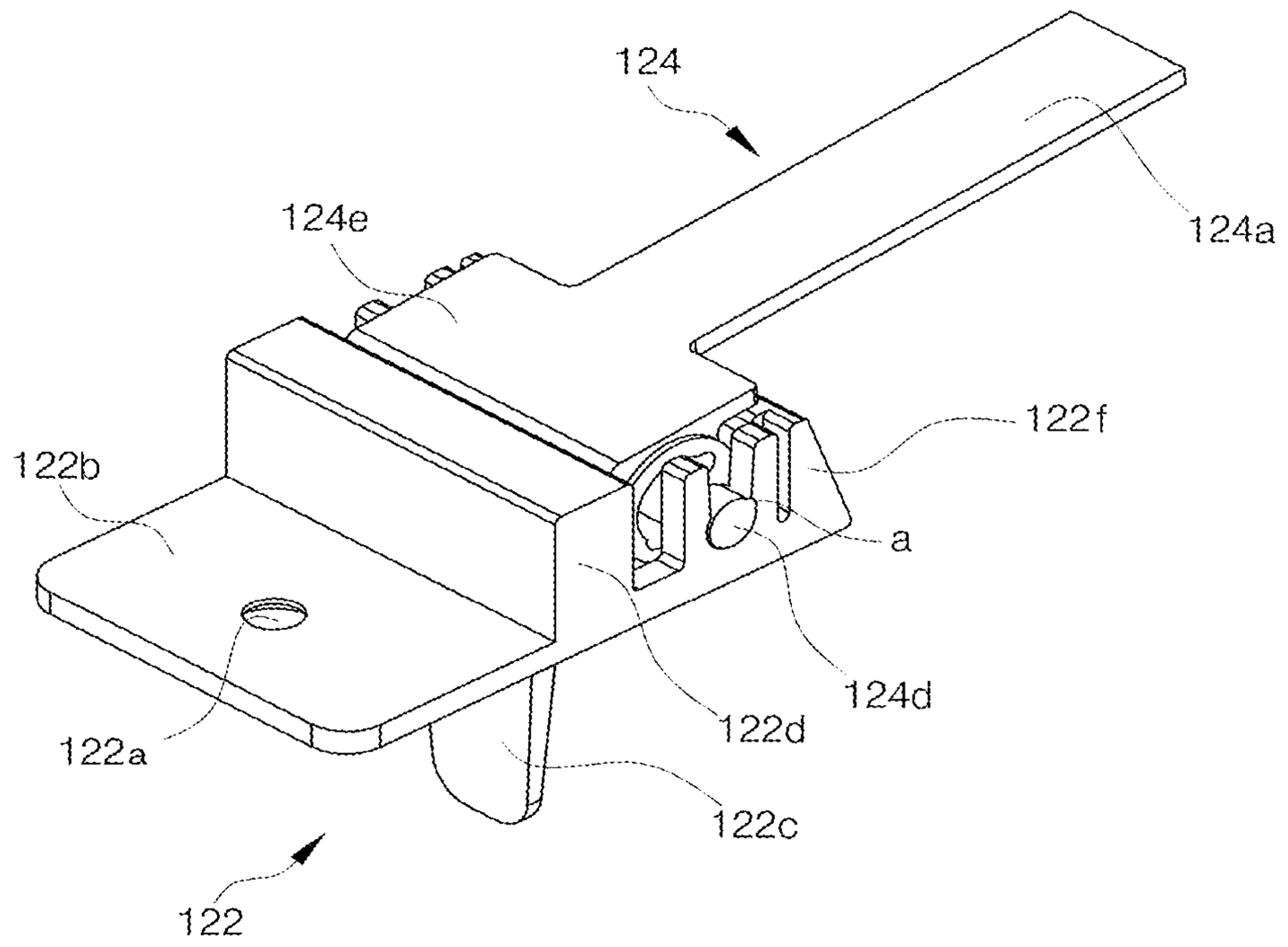
FIG. 19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122d
122a
122c
122

FIG. 20

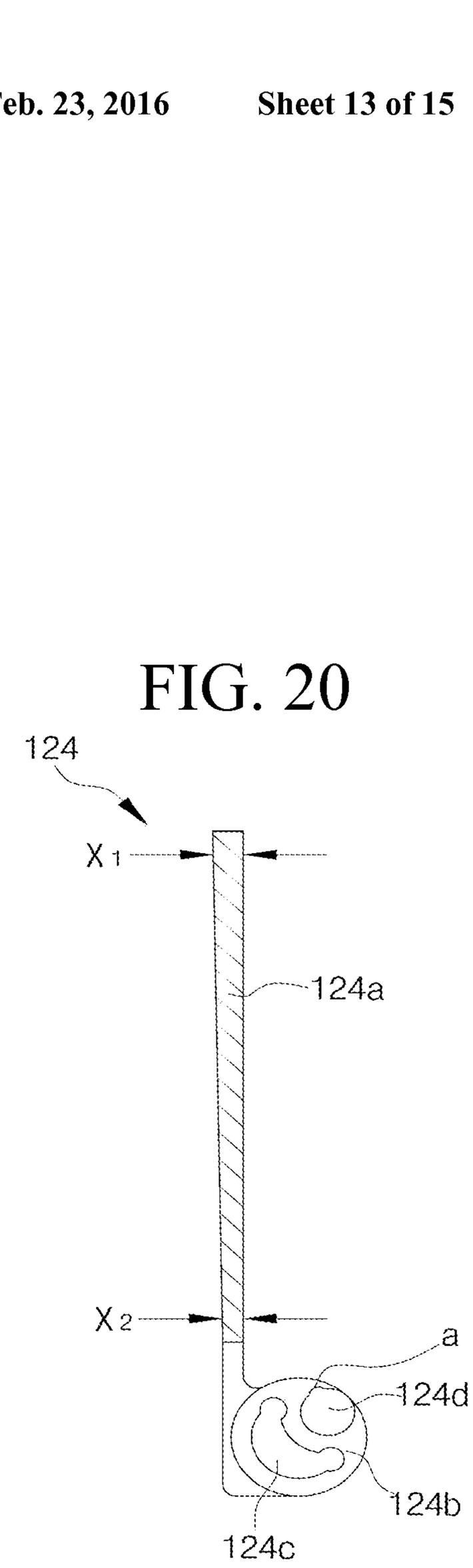


FIG. 21A

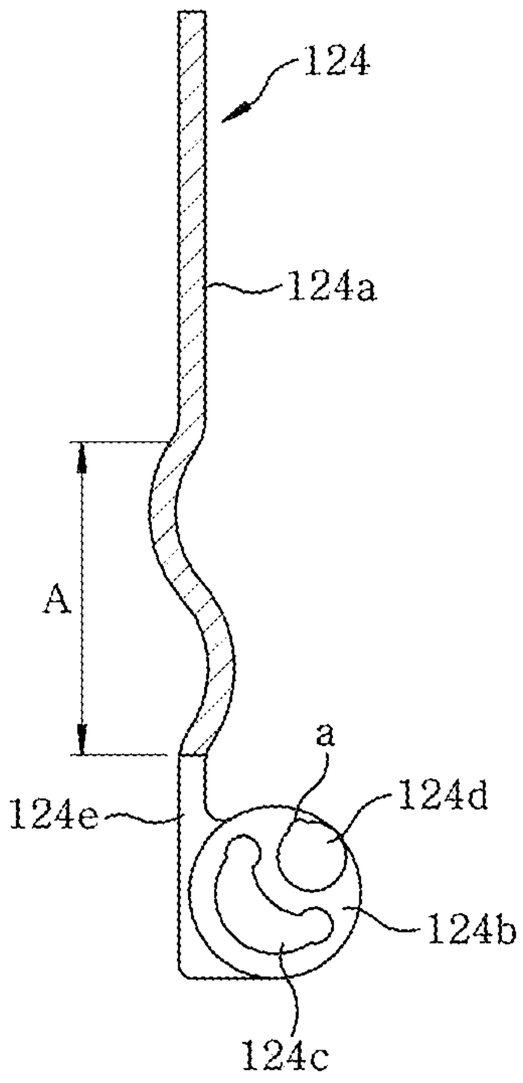



FIG. 21B

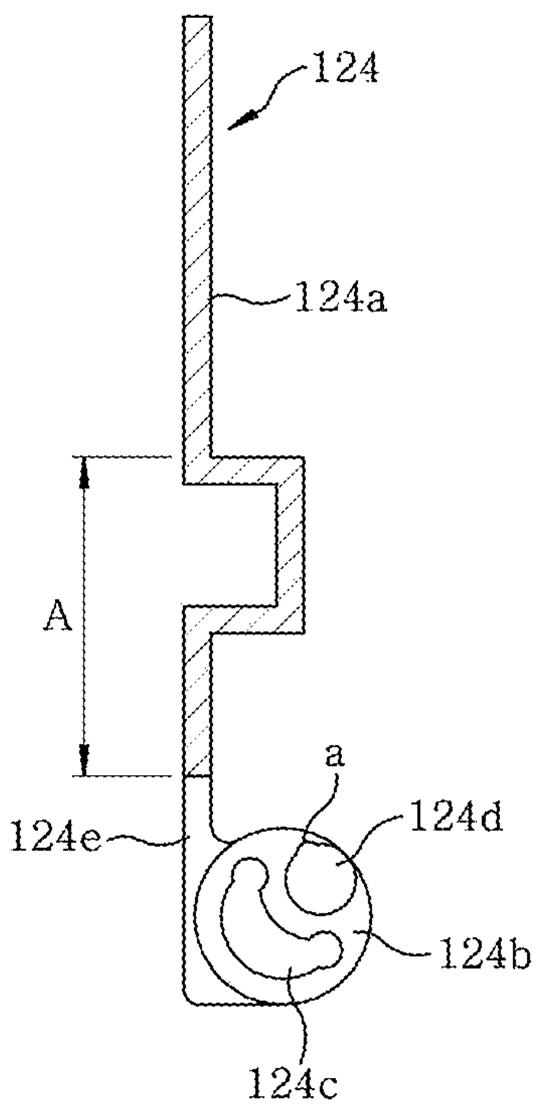



FIG. 21C

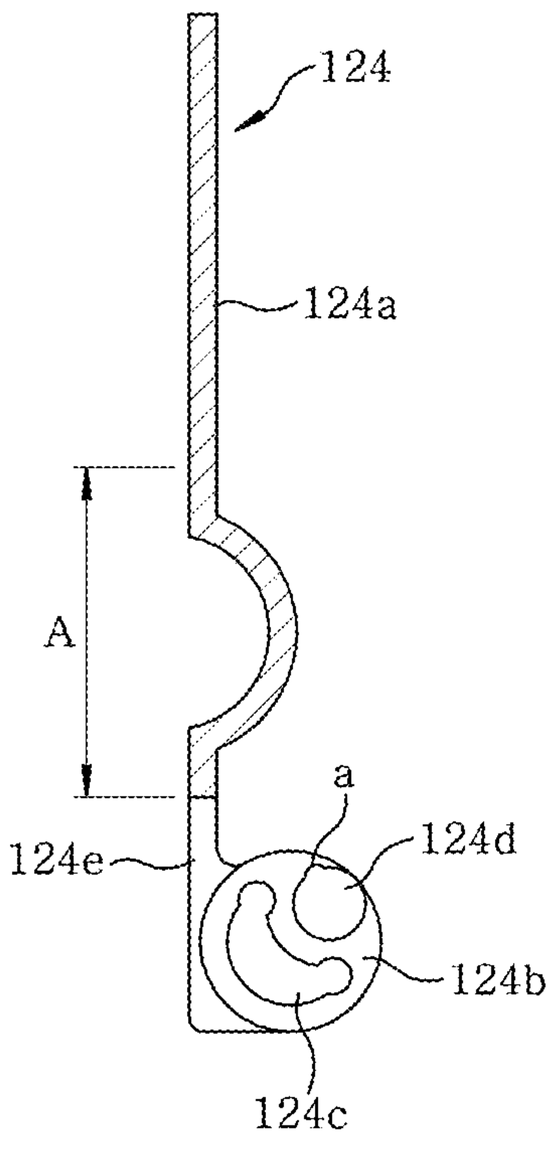
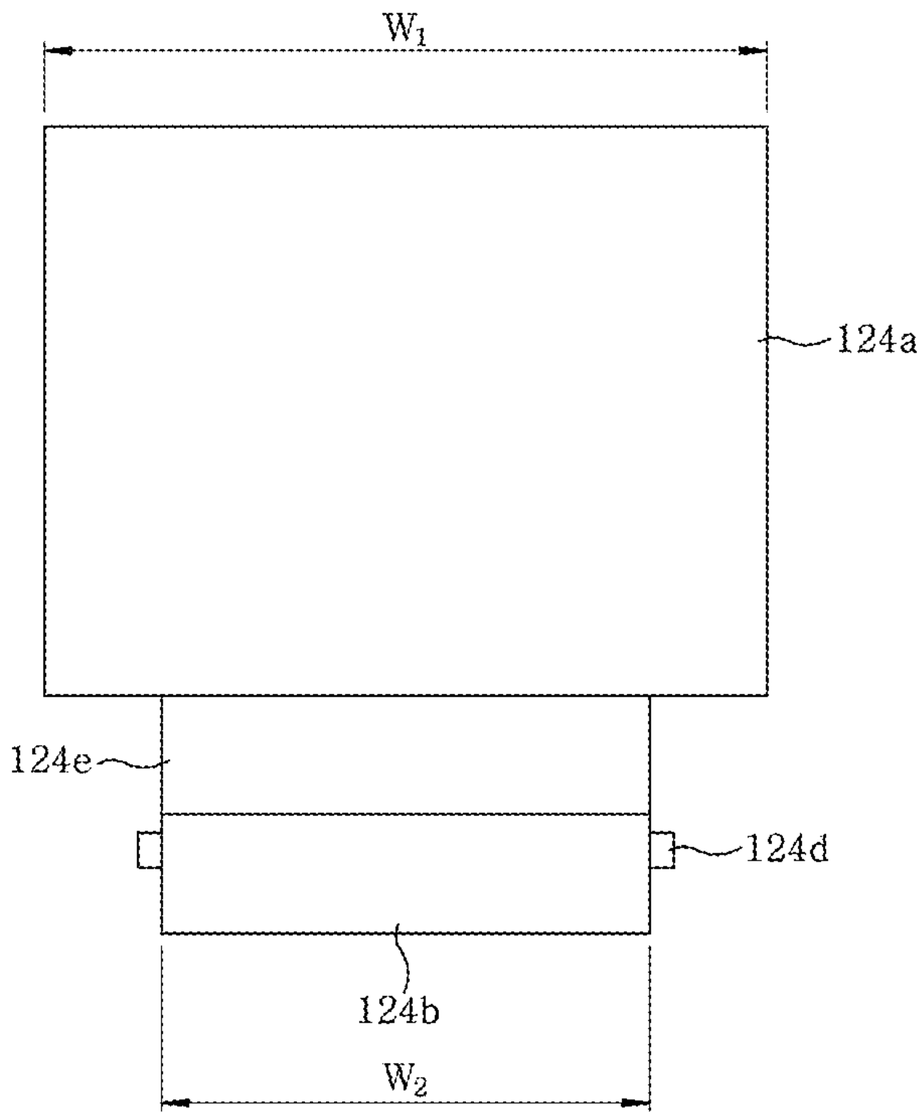


FIG. 22



# HITTING GAME MACHINE ALLOWING SUCCESSIVE INPUT OF COINS

## CROSS REFERENCE TO RELATED APPLICATION AND CLAIM OF PRIORITY

The present application claims the benefit of Korean patent application No. 10-2011-0037629 filed in the Korean Intellectual Property Office on Apr. 22, 2011, the entire content of which is incorporated herein by reference.

## BACKGROUND

1. Field of the Invention

The present invention relates to hitting game machines.

2. Description of the Related Art

In modern times, as the standards of living are increasing, a variety of methods of enjoying leisure time have been introduced. One of the introduced methods of enjoying the leisure time is to use a game machine which is operated in such a way that a user can obtain points according to preset game rules and may receive a gift or the like or be allowed to continue the game depending on the total of obtained points.

A game machine using coins is a representative example of such game machines. The term 'game machine using coins' refers to a machine in which coins that have been input into an upper end of a main body are directly used in the game while free-falling or rotating, predetermined points are given according to preset game rules, and a gift or the like is provided or continuation of the game is allowed depending on the given points.

A representative example of such a game machine using coins was proposed in Korean Patent Application No. 10-2007-0053584 (entitled: 'Game machine using coin and coin guide used in the same). This conventional game machine is illustrated in FIG. **1**.

Referring to the drawing, in the conventional game machine using coins, a plurality of target units **10** are placed upright around the circumference of a circular plate **7**. An identification member is provided on each target unit **10** to identify the target unit **10**. Each target unit **10** is curved at a predetermined radius of curvature and is configured such that it can rotate around an inflection point of the curved portion outwards with respect to the circular plate **7**.

A coin guide unit **20** is provided on a central portion of the circular plate **7** and oriented in one direction. The coin guide unit **20** rolls a coin **5** input thereinto and guides it to try to hit down one of the target units **10** that rotate along with the circular plate **7**.

Furthermore, at least one target standing unit **40** is provided at a position spaced apart from the circular plate **7** by a predetermined distance. Among the target units **10**, the target standing unit **40** functions to stand up target units **10** that have been fallen by the coins **5** to their original positions.

The coin guide unit **20** is curved from the vertical direction to the horizontal direction to enable the coin **5** that has been input thereinto and which is dropped to turn in the horizontal direction and roll on the circular plate **7**. The coin guide unit **20** may be curved at an appropriate radius of curvature so that the coin **5** that is dropping can easily change its direction to the horizontal direction without stopping.

Furthermore, a speed reducer **50** is provided at a predetermined position in the coin guide unit **20** so that the speed of the coin **5** that has been input into the coin guide unit **20** and being dropped can be reduced by the speed reducer **50**. The speed reducer **50** includes at least one small disk **50**. The small disk **50** is mounted to a predetermined portion of the coin guide unit **20** so as to be rotatable around a point on the circumference thereof.



However, in the conventional hitting game machine having the above-mentioned construction, the coin guide must use the separate speed reducer, reducing the speed of the coin that is dropping.

It is difficult to manufacture such a speed reducer because it has a plurality of stop protrusions. Deviation of the manufacturing work makes the speed at which a coin drops different in each game machine.

FIGS. **2** and **3** illustrate an enlargement of a target unit which is coupled to the circular plate of the conventional hitting game machine.

In detail, FIG. **2** is an enlarged view showing the target unit coupled to the circular plate of the conventional hitting game machine. FIG. **3** is a reference view illustrating the operation of rotating the target unit of FIG. **2**. FIG. **4** is a reference view illustrating a process in which a rotating shaft **14***c* of the target unit **10** of FIG. **2** is rotated by a hitting member. Each target unit **10** includes a hinge bracket **12** and a target **14**. The hinge bracket **12** includes a coupling part **12***a* which is coupled to the circumferential outer edge of the circular plate **7**, an identification-member attaching part **12***c* to which an identification member is attached, a target support **12***d*, a target stopper **12***f* and a hinge coupling depression **12***e*. The target **14** includes a rotating shaft **14***c* which includes a cam-shaped hinge, a hit-part support **14***a* and a hit part **14***b*.

The rotating shaft **14***c* is coupled to the hinge coupling depression **12***e*. The hit-part support **14***a* is supported on the circular plate **7** to allow the hit part **14***b* to lean towards the center of the circular plate **7** so that when the target **14** rotates along with the circular plate **7**, the target **14** can be prevented from undesirably falling over due to the centrifugal force or by receiving impacts unrelated to the game.

However, in the target unit having the above-mentioned construction, as shown in FIG. **3**, if while the target **14** has been rotating by Coin **1** that has hit the hit part **14***b*, Coin **2** which is another coin successively rolls to the target **14**, Coin **2** collides with the hit-part support **14***a* that is rotating. Thereby, Coin **2** may be placed on the circular plate rather than entering the hitting member receiver, thus blocking a path of another coin that is rolling on the circular plate, or if coins are placed under the hit-part support **14***a*, they may impede the function of the target standing unit **40**, making the game no longer able to be played.

Furthermore, the rotating shaft **14***c* of the target **14** is disposed under the medial portion of the target. Therefore, if the width of the target is comparatively small, the target that has fallen over may undesirably return to its standing-up position.

Moreover, the rotating shaft **14***c* of the target **14** is inserted into the circular hinge coupling depression **12***e* without use of a separate fastening member, and the thickness of the rotating shaft **14***c* is almost equal to the depth of the hinge coupling depression **12***e*. Therefore, if the width of the hit part **14***b* is less than that of the rotating shaft **14***c*, not only the target may undesirably bounce up due to impact or vibrations but also a coin that passes over the rotating shaft **14***c* affects the rotating shaft **14***c*, thus making the target move as if it had actually been hit despite there having been no hit.

In other words, as shown in FIG. **4**, despite a coin passing by the target without hitting the target, if the coin touches the rotating shaft, the target may rotate as if it had been hit by the coin.

## SUMMARY

Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and a

first object of the present invention is to provide a hitting game machine which allows coins to be successively input thereinto.

A second object of the present invention is to provide a hitting game machine in which, to allow coins to be successively input thereinto, a longitudinal section of a hit surface has a linear shape or a shape that is reduced in width from the upper end thereof to the lower end.

A third object of the present invention is to provide a hitting game machine which is configured such that when a target rotates around an eccentric shaft, the speed at which it rotates can be reduced.

A fourth object of the present invention is to provide a hitting game machine in which a hollow space is formed in the rotating shaft, thus reducing the weight of the rotating shaft.

A fifth object of the present invention is to provide a hitting game machine which does not require a separate speed reducer in a coin guide.

In order to accomplish the first and second objects, the present invention provides a hitting game machine allowing successive input of coins, the hitting game machine being operated in such a way as to sense a target rotated by a hit of a hitting member and to process a game, the target including a rotating shaft provided with an eccentric shaft formed at a position eccentric from a center of the rotating shaft, the rotating shaft rotating on the eccentric shaft, and a hit surface to be hit by the hitting member, the hit surface integrally rotating with the rotating shaft and having a plate shape, a longitudinal section of which is a linear shape or a shape that is reduced in width from an upper end thereof to a lower end.

In order to accomplish the third object, in the hitting game machine allowing successive input of coins according to the present invention, a protrusion may be provided on the surface of the eccentric shaft so that when the rotating shaft rotates, the protrusion selectively makes contact therewith and generates a frictional force depending on an angle at which the rotating shaft rotates.

In order to accomplish the fourth object, in the hitting game machine allowing successive input of coins according to the present invention, the eccentric shaft may include eccentric shafts provided on respective opposite ends of the rotating shaft, and a hollow space having a predetermined length may be formed in each of the opposite ends of the rotating shaft at a position other than the eccentric shaft.

In order to accomplish the first object, the hitting game machine may further include a circular plate to which at least one target is coupled, the circular plate being partitioned into at least one region and being operated by a drive unit, wherein the target is coupled to the circular plate such that even when the target coupled to the circular plate is being rotated or has been rotated by a hit of a hitting member, another subsequent hitting member is allowed to pass over the same target.

The hitting game machine may further include a hinge bracket to which the rotating shaft of the target is rotatably coupled, and at least one coupler provided on the circular plate so that the hinge bracket is coupled to the circular plate by the coupler. The hinge bracket may include a base plate, a first over-rotation-preventing stopper provided on the base plate, a hinge coupling depression formed on the base plate at a position spaced apart from the first over-rotation-preventing stopper by a predetermined distance so that the eccentric shaft of the target is inserted into and supported in the hinge coupling depression, a second over-rotation-preventing stopper provided on the base plate at a position adjacent to the hinge coupling depression, the second over-rotation-preventing stopper being disposed at a position lower than the first over-rotation-preventing stopper.

The hitting member guide may curve from a vertical direction to a horizontal direction to allow the hitting member that has been inserted and is dropped to turn in the horizontal direction and roll on the circular plate towards the target. The hitting member guide may further include a speed reducer reducing a speed at which the hitting member that has been input is dropping, the speed reducer including: a disk installed in the hitting member guide so as to be rotatable around a point on a circumference thereof or a center axis thereof, and a cylindrical stop protrusion provided at a predetermined position on the disk to prevent the disk from rotating beyond a predetermined angle.

In order to accomplish the fifth object, the hitting member guide may have a linear shape that allows the hitting member that has been input into the hitting-member insert port to move towards the target, wherein a bottom surface of the hitting member guide along which the hitting member rolls is wavy or uneven so that a speed at which the hitting member moves downwards is reduced.

In order to accomplish the fifth object, the hitting member guide may be curved from a vertical guide part to a horizontal guide part so that the hitting member that has been input into the hitting-member insert port and has been dropping turns in a direction toward the target and rolls on the circular plate, wherein the vertical guide part has an S shape.

In order to accomplish the sixth object, the target may be configured such that a lower end of the hit surface connected to the rotating shaft has a predetermined height and width.

The hitting game machine may further include a control unit providing a jackpot or a bonus game when a preset one of the at least one target has fallen over a predetermined number of times or more.

## BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a view showing a conventional hitting game machine;

FIG. **2** is an enlarged view showing a target unit which is to be coupled to a circular plate of the conventional hitting game machine;

FIG. **3** is a reference view illustrating the operation of rotating the target unit of FIG. **2**;

FIG. **4** is a reference view illustrating a process in which a rotating shaft of target unit of FIG. **2** is rotated by a coin;

FIG. **5** is a perspective view of a hitting game machine allowing the successive input of coins, according to an embodiment of the present invention;

FIG. **6** is a view illustrating a speed reducer according to an embodiment of the present invention;

FIG. **7** is an enlarged view of a portion of the speed reducer of FIG. **6**;

FIG. **8** is a view illustrating another type hitting member guide according to an embodiment of the present invention;

FIG. **9** is a view illustrating a further type hitting member guide according to an embodiment of the present invention;

FIG. **10** is a view illustrating the operation in which a hitting member hits a target;

FIG. **11** is a view illustrating a visual effect for a hit target;

FIG. **12** is an enlarged view of a target standing unit according to an embodiment of the present invention;

FIG. **13** is a longitudinal sectional view showing an enlargement of a hinge bracket of a target unit;

FIG. **14** is a longitudinal sectional view showing an enlargement of a target which is coupled to the hinge bracket of FIG. **13**;

FIG. **15** is a longitudinal sectional view showing the target of FIG. **14** that is coupled to the hinge bracket;

FIG. **16** is a reference view illustrating the dynamics between the hinge bracket and the target;

FIG. **17** is a reference view illustrating the rotation of the target hit by a hitting member;

FIG. **18** is a longitudinal sectional view showing the target that has been hit and completely rotated downwards;

FIG. **19** is a perspective view of FIG. **18**; and

FIGS. **20** through **22** are views showing other types of targets.

## DETAILED DESCRIPTION

The terms and words used in the specification and claims are not necessarily limited to typical or dictionary meanings, but must be understood to indicate concepts selected by the inventor as the best method of illustrating the present invention, and must be interpreted as having meanings and concepts adapted to the scope and spirit of the present invention for understanding the technology of the present invention.

In the specification, when the explanatory phrase "a part includes a component" is used, this means that the part may further include the component without excluding other components, so long as special explanation is not given. Furthermore, the terms, such as ". . . part", ". . . unit", "module", "device", etc., indicate a unit for processing at least one function or operation, and it can be embodied by hardware, software or a combination of hardware and software.

Hereinafter, an embodiment of the present invention will be described in detail with reference to the attached drawings.

FIG. **5** is a perspective view of a hitting game machine allowing the successive input of coins, according to an embodiment of the present invention. As shown in FIG. **5**, the hitting game machine **100** according to the embodiment of the present invention includes a circular plate **110**, a plurality of target units **120**, hitting member guides **130**, target standing units **140**, target sensing units **150**, hitting member receivers **160** and a control unit **180**.

The circular plate **110** is partitioned into one or more regions and is provided so as to be rotatable. The target units **120** are coupled by screws to respective couplers (not shown), which are provided on a circumferential outer edge of the circular plate **110**. The target units **120** are provided on the circumferential outer edge of each of the regions of the circular plate **110**. Furthermore, an identification member is provided under each target unit **120**.

Each region of the circular plate **110** is partitioned into a plurality of sections, each of which has a fan shape that has the center of the circular plate **110** as its center and includes the corresponding target unit **120**. A light source is electrically connected to a rear surface of each section of the circular plate **110** so that each section can flash on and off.

Referring to FIG. **11** illustrating a visual effect for indicating that a target unit **120** has been hit, when a hitting member **170** that has rolled out of the hitting member passing channel **133** hits the target unit **120** and enters the corresponding hitting member receiver **160**, the corresponding light source is operated so that the corresponding section (in the drawing, designated by "a") of the circular plate **110** that pertains to the hit target unit **120** flashes on and off.

Each target unit **120** includes a hinge bracket **122** and a target **124**. The hinge bracket **122** is fastened to the circular plate **110**. The target **124** is hinged to the hinge bracket **122** so that when a hitting member **170** hits the target **124**, the target **124** rotates outwards with respect to the circular plate **110**. As stated above, the target units **120** are provided on the circumferential edges of the respective sections of the circular plate **110**, and each target unit **120** has the identification member under the lower end thereof.

FIG. **10** is a view illustrating the operation in which a hitting member hits a target **124**. A hitting member **170** rolls out of the hitting member guide **130** to hit a target **124** and then enters the hitting member receiver **160**.

The construction of the target unit **120** will now be explained in detail with reference to FIGS. **13** through **18**.

FIG. **13** is a longitudinal sectional view showing an enlargement of the hinge bracket **122** of the target unit **120**. FIG. **14** is a longitudinal sectional view showing an enlargement of the target **124** which is coupled to the hinge bracket **122**. FIG. **15** is a longitudinal sectional view showing the target **124** that is coupled to the hinge bracket **122**. FIG. **17** is a reference view illustrating the rotation of the target **124** hit by a hitting member **170**. FIG. **18** is a longitudinal sectional view showing the target **124** that has been hit and completely rotated downwards. The hinge bracket **122** is coupled to the corresponding coupler which is provided on the circumferential outer edge of the circular plate **110**, and a rotating shaft **124***b* of the target **124** is coupled to the hinge bracket **122** so that the target **124** can rotate with respect to the hinge bracket **122**.

Each target unit **120** includes the hinge bracket **122** and the target **124**. The hinge bracket **122** includes a coupling part **122***a* which is coupled to the circumferential outer edge of the circular pate **110**, an identification member attaching part **122***c* to which the identification member is attached, a first over-rotation-preventing stopper **122***d*, a second over-rotation-preventing stopper **122***f* and a hinge coupling depression **122***e*. The target **124** includes a hit surface **124***a* and a rotating shaft **12***b*.

In detail, referring to FIGS. **13** showing an enlargement of the hinge bracket **122**, the hinge bracket **122** includes a base plate **122***b*, the first over-rotation-preventing stopper **122***d* which is provided on an upper surface of the base plate **122***b*, the hinge coupling depression **122***e* which is formed on the upper surface of the base plate **122***b* at a position spaced apart from the first over-rotation-preventing stopper **122***d* by a predetermined distance so that an eccentric shaft **124***d* of the target **124** is inserted into the hinge coupling depression **122***e*, and the second over-rotation-preventing stopper **122***f* which is provided on the upper surface of the base plate **122***b* at a position adjacent to the hinge coupling depression **122***e*.

The hinge bracket **122** having the above-mentioned construction is coupled to the coupler (not shown) of the circular plate **110** such that even when the target **124** that is coupled to the hinge bracket **122** is being rotated or has been rotated by a hitting member **170**, another subsequent hitting member **170** is allowed to pass through the same target **124**.

Adjusting the relative heights of the first over-rotation-preventing stopper **122***d* and the second over-rotation-preventing stopper **122***f* can make it smoother for successive hitting members **170** to hit the target **124** and pass through it. For instance, if the height of the second over-rotation-preventing stopper **122***f* is less than that of the first over-rotation-preventing stopper **122***d*, the hitting members **170** can easily enter the hitting member receiver **160**.

Furthermore, the hinge coupling depression **122***e* is formed to a depth Y such that the rotating shaft **124***b* is disposed at a sufficiently low position to allow the hitting members **170** that are rolling to pass over the rotating shaft **124***b* without touching it

The shape of the hinge coupling depression **122***e* corresponds to that of a hinge so that the rotating shaft **124***b* can be inserted and reliably supported in the hinge coupling depression **122***e*, thus preventing even a small impact or vibration from easily causing the target **124** to fall over.

That is, referring to FIG. **13**, because the second over-rotation-preventing stopper **122***f* is designed to be lower than the first over-rotation-preventing stopper **122***d* by a distance "X", a hitting member **170** that has hit the target **124** can more easily pass over the first over-rotation-preventing stopper **122***d*.

Furthermore, the hinge coupling depression **122***e* is formed to a position deeper than the diameter of the rotating shaft **124***b*, thereby preventing a rolling surface of the hitting member **170** from touching the rotating shaft **124***b* and causing the target **124** to fall over when the hitting member **170** is passing by the target **124**.

In addition, a width Wd between the first over-rotation-preventing stopper **122***d* and the second over-rotation-preventing stopper **122***f* is determined such that the rolling surface of the hitting member **170** is prevented from touching any portion of the rotating shaft **124***b* when the hitting member **170** passes over the first and second over-rotation-preventing stoppers **122***d* and **122***f*.

FIG. **16** is a reference view illustrating the dynamics between the hinge bracket and the target. Referring to the drawing, the width Wd between the first over-rotation-preventing stopper **122***d* and the second over-rotation-preventing stopper **122***f* is set such that when the rolling surface of the hitting member **170** comes into contact with both the first and second over-rotation-preventing stoppers **122***d* and **122***f*, no portion of the rolling surface of the hitting member **170** makes contact with the rotating shaft **124***b*.

That is, there is at least a space Wh defined between the lower portion of the rolling surface of the hitting member **170** and the upper surface of the rotating shaft **124***b* so that the lower portion of the rolling surface of the hitting member **170** does not come into contact with the upper surface of the rotating shaft **124***b* under any circumstances.

A coupler such as a screw is used to couple the coupling part **122***a* of the hinge bracket **122** to the circumferential outer edge of the circular plate **110**. An identification member is attached to the identification-member attaching part **122***c* to allow the target sensing unit **150** to identify the corresponding target **124** using the identification member.

In other words, the identification member stores positional information of the corresponding target **124** to allow the target sensing unit **150** to detect which target **124** has been fallen and which region the target **124** is in.

The first over-rotation-preventing stopper **122***d* functions to support the hit surface **124***a* of the target **124** to allow the target **124** to lean towards the center of the circular plate **110** so that when the circular plate **110** rotates, the target **124** coupled to the hinge bracket **122** can be prevented from undesirably being fallen by the centrifugal force or vibrations unrelated to the game. The second over-rotation-preventing stopper **122***f* functions to prevent the target **124**, which has been hit by a hitting member **170** and fallen over, from excessively rotating.

For this, the longitudinal sectional shape of the hit surface is linear. Here, the term 'longitudinal section' is a term that is determined based on the hit surface, to which a hitting member hits, designating the oblique line portions of FIGS. **14** through **18**.

The hinge coupling depression **122***e* is coupled to the eccentric shaft **124***d* of the target **124** so that the target **124** can be reliably coupled to the hinge bracket **122**. Furthermore, the eccentric shaft **124***d* and the hinge coupling depression **122***e* are configured such that when the target **124** leans to a predetermined angle, frictional force is generated therebetween, thus reducing the force with which the target **124** rotates.

To achieve the above purpose, a protrusion "a" is provided on the eccentric shaft **124***d* of the target **124** (refer to FIG. **14**). Thus, when the eccentric shaft **124***d* that is coupled to the hinge coupling depression **122***e* rotates to the predetermined angle, the protrusion "a" comes into contact with a side surface of the hinge coupling depression **122***e*, thus generating friction therebetween, thereby reducing the force with which the target **124** rotates.

The eccentric shafts **124***d* having the above-mentioned structure are provided on the respective opposite ends of the rotating shaft **124***b*. A hollow space **124***c* of a predetermined length is formed in each of the opposite ends of the rotating shaft **124***b* at a position other than the eccentric shaft **124***d*, thus reducing the weight of a lower end of the target **124**.

Referring to FIG. **14**, the hollow space **124***c* is formed in a portion of the rotating shaft **124***b* other than the eccentric shaft **124***d*.

The reason for this shape of the target **124** is to prevent a fine impact or vibrations that do not pertain to a normal hit from causing the target **124** to fall over and to prevent the target **124** that has fallen over from undesirably returning, particularly, in the case of a narrow target **124**.

Referring to FIG. **15**, the hit surface **124***a* of each target **124** is a portion that is hit by a member **170** and is supported by the first over-rotation-preventing stopper **122***d* such that the target **124** leans towards the center of the circular plate **110** to prevent the target **124** from falling over due to the centrifugal force generated when the target unit **120** rotates along with the circular plate **110**.

Furthermore, the target units **120** are configured such that the heights of the targets **124** are the same but their widths are different from each other. Depending on the width of each target **124**, a corresponding one of different points, gifts, tickets and medals is set for the target units **120**, and as a target **124** is hit, the corresponding item is indicated.

In this embodiment, although the longitudinal sectional shape of the hit surface **120** has been illustrated as being linear, the longitudinal section of the hit surface **120** that is in the stand-up state may have a shape that is reduced in thickness from the upper end thereof to the lower end, as shown in FIG. **20**, showing the shape of another example of the target **124**.

In other words, a width $X_2$ of the lower end of the longitudinal section of the hit surface **120** that is adjacent to the rotating shaft is less than a width $X_1$ of the upper end thereof.

In this case, the center of gravity of the hit surface is located at a comparatively high position. Therefore, after the target **124** has rotated downwards, the target **124** can be more effectively prevented from undesirably returning due to the repulsive force generated when the target **124** rotates downwards.

As shown in FIGS. **21** through **22** showing other examples of the shape of the target, the shape between the hit surface **124***a* and a rolling plate **124***e* of the target **124** can be modified into a variety of shapes.

Referring to FIGS. **21**A through **21**C, the shape of a longitudinal section (A) of a portion between the hit surface **124***a* and the rolling plate **124***e* may be an S shape (FIG. **21**A), a stepped shape (FIG. **21**B), or a semicircular shape (FIG. **21**C). Furthermore, referring to FIG. **22**, a width W**1** of the hit surface **124***a* may be greater than a width W**2** of the rolling plate **124***e*.

The embodiment of the present invention is technically characterized both by the rotating shaft having the eccentric

shaft **124***d* and the hollow space **124***c* and by the plate-shaped hit surface **124***a*, but the shape of the hit surface is not limited to a special shape.

The process in which the target **124** is hit and rotated downwards will be explained. First, as shown in FIG. **15**, the eccentric shaft **124***d* of each target **124** is inserted into and supported in the hinge coupling depression **122***e* formed on the upper surface of the base plate **122***b* of the corresponding hinge bracket **122** such that the hit surface **124***a* is supported by the first over-rotation-preventing stopper **122***d*. The circular plate **110** subsequently rotates.

The characteristic structure of the rotating shaft **124***b* having the eccentric shaft **124***d* and the hollow space **124***c* makes the target **124** stay in the state of being stably coupled despite the rotation of the circular plate or fine vibrations.

Thereafter, if a hitting member **170** is input and then hits the hit surface **124***a* of the target **124** after passing through the hitting member guide **130**, the hit surface **124***a* that has been hit is rotated around the eccentric shaft **124***d* outwards from the circular plate **110**, as shown in FIG. **17**.

During the rotation of the target **124**, the protrusion "a" of the eccentric shaft **124***d* comes into contact with the side surface of the hinge coupling depression **122***e*, thus offsetting some of the rotating force of the target **124**. Subsequently, when the target **124** has completely rotated, as shown in FIG. **18**, the hit surface **124***a* is supported by the second over-rotation-preventing stopper **122***f*.

Here, when the target **124** that has been rotating collides with the second over-rotation-preventing stopper **122***f*, even if the target **124** bounces off the second over-rotation-preventing stopper **122***f*,the rotating shaft **124***b* having the eccentric shaft **124***d* and the hollow space **124***c* and the protrusion "a" formed on the eccentric shaft **124***d* offset the repulsive force, thus preventing the target **124** from being returned to its original position.

In the embodiment of the present invention that is operated in the above-mentioned manner, even when the target **124** is rotating or has completely rotated, several hitting members **170** can successively hit the same target **124** or pass over it.

That is, the present invention is characterized in that the target unit **120** is coupled to the circular plate **110** such that even when the target **124** of the target unit **120** coupled to the circular plate **110** is being rotated by a hit of a hitting member **170** or has been rotated, another successive hitting member is allowed to go towards or pass over the target unit **120**.

One example of such a configuration for realizing the above purpose is a configuration made such that the hit surface **124***a* that has been completely rotated downwards is lower than the upper surface of the circular plate **110**.

In other words, as stated above, the height of the second over-rotation-preventing stopper **122***f* is set such that it is lower than that of the first over-rotation-preventing stopper **122***d* by the distance "X" so that the height of the first over-rotation-preventing stopper **122***d* is equal to or higher than that of the hit surface **124***a* after the hit surface **124***a* has been hit and completely rotated downwards.

However, the present invention is not limited to the configuration in which the height of the second over-rotation-preventing stopper **122***f* is set such that it is lower than that of the first over-rotation-preventing stopper **122***d* by the distance "X".

The reason for this is because the above-mentioned height difference cannot be an issue due to several factors, such as a rotating speed of the rolling hitting member that results from the shape or height of the hitting member guide **130**, a rotating speed of the circular plate, the weight of the hitting member, etc.

In other words, as shown in FIG. **19**, even if the height of the hit surface **124***a* that has completely rotated downwards is equal to or higher than that of the first over-rotation-preventing stopper **122***d*, changing the shape or height of the hitting member guide **130** or the shape or weight of the hitting member **170** can allow several successive hitting members **170** to move towards the same target **124** and pass over it.

Moreover, the width of the rolling plate **124***e* (refer to FIG. **19**), which has a predetermined height and is coupled to the lower end of the hit surface **124***a* to connect it to the rotating shaft **124***b* of the target **124**, is the same as that of the rotating shaft **124***b*. Hence, even when a target **124** that has been hit by a hitting member **170** is being rotated or has been rotated, the hitting member **170** can more easily roll on the rolling plate **124***e* and pass over the target unit **120** without being impeded by the over-rotation-preventing stopper or the hinge bracket **122**.

Each hitting member guide **130** is installed on a central portion of the corresponding region of the circular plate **110** and oriented in one direction. A hitting member insert port is provided on one end of the hitting member guide **130**. The hitting member guide **130** guides a hitting member **170** input into the hitting-member insert port to move towards the target **124** and try to hit one of the targets **124**.

Referring to FIG. **5**, in this embodiment, the circular plate **110** is partitioned into four regions, and the hitting member guide **130** includes four hitting member guides **130**, thus allowing four persons to enjoy the game at the same time.

Furthermore, because a hitting member **170** that has come out of the hitting member guide **130** moves towards the targets **124** in unlimited patterns, the number of hitting member guides **130** may be less than or equal to the number of regions of the circular plate **110**.

FIG. **6** is a view illustrating the hitting member guide **130** according to an embodiment of the present invention. The hitting member guide **130** will be explained in more detail with reference to FIG. **6**.

Each hitting member guide **130** has a curved portion which is curved at a predetermined angle and formed at a height adjacent to the circular plate **110** so that a hitting member **170** that has been inserted into the hitting-member insert port and has dropped downwards can move along the hitting member passing channel **133** towards the targets **124**.

That is, the curved portion curves from the vertical direction to the horizontal direction to allow the hitting member **170** that has been inserted and been being dropped to turn in the horizontal direction and roll on the circular plate **110**. Here, the curved portion may be curved at an appropriate radius of curvature so that the moving direction of the hitting member **170**, which is dropping, can be smoothly converted into the horizontal direction without the hitting member **170** being stopped.

In addition, each hitting member guide **130** includes a plurality of speed reducers **132** which reduce the speed at which the hitting member **170** that has been inserted into the hitting member guide **130** drops at.

The speed reducer **132** will be explained in detail with reference to FIG. **7** that illustrates the construction of the speed reducer **132**.

Each speed reducer **132** includes a small disk **132** which is installed in the hitting member guide **130** so as to be rotatable around a point on the circumference thereof or a center axis thereof. A cylindrical stop protrusion **132***a* is provided at a predetermined position on the disk **132** to prevent the disk **132** from rotating beyond a predetermined angle.

The speed reducer **132** may be made of a material, such as plastic or the like, that is lighter than that of the hitting member **170**.

The presence of the stop protrusion **132***a* makes it possible to appropriately control the speed at which the hitting member **170** drops, thus enabling users to enjoy the game, as a means for relieving stress, with an easy mind without undesirably pausing to wait for the game.

As such, the hitting member guides **130** are provided on the central portion of the circular plate **110** towards the targets **124**. Each hitting member guide **130** is configured such that: the hitting-member insert port is provided on the upper end thereof; the hitting member passing channel **133** communicates with the insert port and extends from the upper end of the hitting member guide **130** to the lower end thereof; a hitting-member outlet port is provided on the lower end of the hitting member guide **130** and extends a predetermined length towards the circumferential outer edge of the circular plate **110**; and the hitting member **170** is inserted into the insert port and moves at a speed reduced by the speed reducers **132** along the hitting member guide **130** and is guided to hit one of the targets **124** of the target units **120** that are rotating along with the circular plate **110**.

Furthermore, the thickness of the hitting member guide **130** may be slightly greater than that of the hitting member **170** so that the hitting member **170** inserted thereinto can uniformly move through it without being stuck or leaning.

In the embodiment of the present invention, although the hitting member guide **130** has been illustrated as being configured such that the curved portion is curved at a predetermined angle at a height adjacent to the circular plate **110**, the shape of the hitting member guide **130** may be linear, or a vertical guide part of the hitting member guide **130** may be in an S shape.

The reason for forming the S-shaped vertical part is because the structure that can reduce the speed of the hitting member **170** can be simplified without the use of a separate speed reducer.

In detail, the hitting member guide **130** curves from the vertical guide part to a horizontal guide part so that a hitting member **170** that has been inserted into the hitting-member insert port and been dropping can turn towards the targets **124** and roll on the circular plate **110**, wherein the vertical guide part has an S shape so that friction between the hitting member **170** that is dropping and the opposite sidewalls of the vertical guide part naturally reduce the speed of the hitting member **170**.

Referring to FIG. **8** illustrating the S-shaped vertical guide part of the hitting member guide **130**, the vertical guide part is curved in an S shape with respect to the lateral direction. Thus, when the hitting member **170** is dropping along the hitting member passing channel **133**, it collides with the sidewalls **133***a* of the hitting member guide **130**, thus naturally reducing the speed at which the hitting member **170** is dropping.

FIG. **9** is a view showing another example of the shape of the hitting member guide **130**. Referring to this drawing, the hitting member guide **130** has a linear shape that enables a hitting member **170** that has been inserted into the hitting-member insert port to move towards the targets **124**. Further, a bottom surface **134** of the hitting member passing channel **133** along which the hitting member **170** rolls is wavy or uneven so that the speed of the hitting member **170** that has been inserted into the hitting member passing channel **133** and moved downwards can be reduced by the friction between the hitting member **170** and the bottom surface **134**.

Each target standing unit **140** is disposed at a position following the corresponding target sensing unit **150**, which will be explained later herein, with respect to the direction in which the circular plate **110** rotates. The target standing unit **140** functions to stand up the targets **124** that have been rotated downwards by hits of hitting members **170**.

The target standing unit **140** is spaced apart from the circumferential outer edge of the circular plate **110** to a height lower than the targets **124**, whereas the height thereof is gradually increased in the direction in which the circular plate **110** rotates.

The structure of the target standing unit **140** according to an embodiment of the present invention will be described in detail with reference to FIG. **12** showing an enlargement of the target standing unit **140**. The target standing units **140** are installed in the hitting game machine **100** of an embodiment of the present invention, wherein each target standing unit **140** includes a base **141** and a target standing plate **142**. The base **141** is disposed at a position spaced apart from the circumferential outer edge of the circular plate **110** to a height lower than the targets **124**. The target standing plate **142** is provided on the base **141**, and the height thereof is gradually increased in the direction in which the circular plate **110** rotates. Further, the target standing plate **142** is inclined at a predetermined angle towards the center of the circular plate **110**. Thanks to the above-mentioned shape of the target standing unit **140**, while the circular plate **110** is rotating, the target standing unit **140** can stand up the targets **124** that have fallen over.

The target sensing units **150** are provided at positions corresponding to the respective regions of the circular plate **110** in order to sense the targets **124** that have fallen over using the identification members provided on the identification-member attaching parts **122***c* of the target units **120** that have been fallen by hitting members **170**. That is, among the target units **120**, each target sensing unit **150** functions to sense the target **124** of a target unit **120** that has fallen over.

The target sensing unit **150** can be embodied such that it outputs a different sensing signal depending on the width of each target **124**. In other words, the target sensing unit **150** can be configured such that it outputs the same sensing signal with regard to targets **124** having the same width.

With respect to the direction in which the circular plate **110** rotates, each target sensing unit **150** and the corresponding target standing unit **140** are arranged in such a way that the target sensing unit **150** is disposed ahead of the target standing unit **140** so that the operation of standing up the target **124** follows the operation of sensing the target **124**.

The hitting member receivers **160** are provided at positions corresponding to the respective hitting member guides **130**. The hitting member receivers **160** function to receive hitting members **170** that have hit targets **124** or passed them by.

That is, to prevent the hitting members **170** coming out of each hitting member guide **130** from rolling or falling out of the game machine, each hitting member receiver **160** is disposed at a position corresponding to the relative hitting member guide **130** and covers the corresponding region of the circular plate **110** in a wide manner.

Furthermore, an indication unit (not shown) may be installed above each hitting member guide **130**. The indication unit functions to display a bonus point or gift corresponding to the target **124** that has been sensed by the target sensing unit **150**.

A rotating unit (not shown) is provided under the rear surface of the circular plate **110** and rotates the circular plate **110** at a constant speed.

Depending on the width of the target **124** of each of the target units **120** having different shapes, a corresponding one of different points, gifts, tickets and medals is set for the target units **120**. After the game has begun, the control unit **180** rotates the circular plate **110**, and when an input hitting member **170** hits a target **124**, the corresponding target sensing unit **150** senses the target **124** under the control of the control unit **180**. Then, the control unit **180** instructs the indication unit **131** to display the corresponding one of the points, gifts, tickets and medals that is set for the sensed target **124**.

Furthermore, the control unit **180** instructs the light source of the section pertaining to the sensed target **124** to flash on and off or may control the game machine such that when it is sensed that a preset target **124** has fallen over a predetermined number of times or more, a jackpot is provided or a bonus game is given.

The hitting game machine may further include a storage unit (not shown) which stores a list of prizes corresponding to the respective targets **124**. In this case, when a target sensing unit **150** senses that a target **124** has been hit, the name of a prize corresponding to the target **124** may be picked up from the storage unit and displayed on the indication unit **131**, or the corresponding prize may be directly provided, of course.

The operation of the hitting game machine having the above-mentioned construction will now be described.

Once the game begins, the circular plate **110** provided with the target units **120** rotates. A user successively inputs hitting members **170** into any one of the hitting member guides **130**. The successively input hitting members **170** drop downwards while the speed reducers **132** reduce the speeds of the hitting members **170**, and then move along the hitting member passing channel **133**.

If at least one of the hitting members **170** that have passed through a hitting member guide **130** hits one of the targets **124** that are provided in the corresponding region of the circular plate **110** that is rotating, the corresponding target sensing unit **150** senses, using the corresponding identification member, the target **124** that has been fallen by the hitting member **170**. The indication unit (not shown) which is disposed above the hitting member guide **130** displays a bonus point or gift corresponding to the sensed target **124**.

Furthermore, as stated above, each region of the circular plate **110** is partitioned into sections, each of which has a fan shape that has the center of the circular plate **110** as its center and includes the corresponding target unit **120**, and the light source is electrically connected to the rear surface of each section of the circular plate **110** so that each section can flash on and off. Thus, when the target **124** falls over, the corresponding light source flashes on and off, providing a visual effect.

Thereafter, the target standing unit **140** returns the target **124** that has fallen over to its original position, thus preparing the targets **124** for a game in a subsequent region.

As described above, a hitting game machine according to the embodiments of the present invention allows a user to input hitting members thereinto. Therefore, the user can more interestingly enjoy the game without the game being suspended.

The embodiments of the present invention can prevent rotation of a circular plate or fine impact such as vibrations or the like from easily felling targets of target units provided on the circular plate. Therefore, only fallen targets can be precisely sensed. Thus, the user can enjoy the game in a more reliable manner.

In addition, a hollow space is formed in a rotating shaft of each target to reduce the weight of the rotating shaft, thus making it possible to fell only a target that has been hit more precisely.

Furthermore, the shape of a hitting member guide can be modified into a variety of shapes. A separate speed reducer may not be used. In this case, the production cost of the hitting game machine can be reduced, and the structure thereof can be further simplified. Moreover, the user can select one of different shapes of guides and enjoy the game.

Because the embodiments of the present invention is configured such that only a hit target is precisely sensed, the user can enjoy the game in a correct manner.

Although the embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

What is claimed is:

**1**. A hitting game machine allowing successive input of coins, the hitting game machine being operated in such a way as to sense a target rotated by a hit of a hitting member and to process a game, the hitting machine comprising:

a plurality of target units, each target unit comprising:

a hinge bracket, the hinge bracket including a hinge coupling depression; and

a target, the target comprising:

a rotating shaft;

an eccentric shaft formed at a position eccentric from a center of the rotating shaft, the rotating shaft rotating on the eccentric shaft the eccentric shaft inserted into and rotatably supported in the hinge coupling depression, wherein a protrusion is provided on a surface of the eccentric shaft so that when the rotating shaft rotates, the protrusion selectively makes contact with a side surface of the hinge coupling depression, and generates a frictional force depending on an angle at which the rotating shaft rotates; and

a hit surface to be hit by the hitting member, the hit surface integrally rotating with the rotating shaft and having a plate shape, a longitudinal section of which is a linear shape or a shape that is reduced in width from an upper end thereof to a lower end; and

a circular plate to which the hinge bracket of each target unit is coupled, wherein each target is coupled to the circular plate such that even when the target coupled to the circular plate is being rotated or has been rotated by a hit of the hitting member, another subsequent hitting member is allowed to pass over the same target,

wherein the hinge bracket supports the hit surface of the target to allow the target to lean towards the center of the circular plate.

**2**. The hitting game machine as set forth in claim **1**, wherein the eccentric shaft comprises first and second eccentric shafts provided on the respective opposite ends of the rotating shaft, and a hollow space is formed in each of the opposite ends of the rotating shaft at a position other than the eccentric shaft, the hollow space having a predetermined length.

**3**. The hitting game machine as set forth in claim **1**, wherein the circular plate is partitioned into at least one region and is operated by a drive unit.

**4**. The hitting game machine as set forth in claim **1**, wherein the hinge bracket comprises:

a base plate;

a first over-rotation-preventing stopper provided on the base plate to support the hit surface of the target to allow the target to lean towards the center of the circular plate;

wherein the hinge coupling depression is formed on the base plate at a position spaced apart from the first over-rotation-preventing stopper by a predetermined distance so that the eccentric shaft of the target is inserted into and supported in the hinge coupling depression; and

a second over-rotation-preventing stopper provided on the base plate at a position adjacent to the hinge coupling depression.

**5**. The hitting game machine as set forth in claim **4**, wherein there is at least a space defined between the lower portion of a rolling surface of the hitting member and an upper surface of the rotating shaft when the hitting member comes into contact with the first and second over-rotation-preventing stoppers, wherein the hinge coupling depression is formed to a depth such that the rotating shaft is disposed at a sufficiently low position to allow the hitting members that are rolling to pass over the rotating shaft, and wherein a width between the first over-rotation-preventing stopper and the second over-rotation-preventing stopper is determined such that the rolling surface of the hitting member is prevented from touching any portion of the rotating shaft.

**6**. The hitting game machine as set forth in claim **3**, further comprising:

a hitting member guide provided at a predetermined position on each of the at least one region of the circular plate and oriented towards the targets, with a hitting-member insert port provided on one end of the hitting member guide, the hitting member guide guiding the hitting member input into the hitting-member insert port to move towards the targets and to hit one of the targets;

a target sensing unit provided in each of the at least one region of the circular plate, the target sensing unit sensing the target that has been fallen by the hitting member;

an indication unit provided at a predetermined position of the hitting member guide, the indication unit indicating at least one of a bonus point, a gift, a ticket and a medal that corresponds to the target sensed by the target sensing unit; and

a target standing unit disposed at a position coming next after the target sensing unit with respect to a direction in which the circular plate rotates, the target standing unit returning the target that has rotated by the hit of the hitting member to an original position thereof.

**7**. The hitting game machine as set forth in claim **6**, wherein the hitting member guide is curved from a vertical direction to a horizontal direction to allow the hitting member that has been inserted and is dropped to turn in the horizontal direction and roll on the circular plate towards the targets, the hitting member guide further comprising:

a speed reducer reducing a speed at which the hitting member that has been input is dropping, the speed reducer comprising a disk installed in the hitting member guide so as to be rotatable around a point on a circumference thereof or a center axis thereof and a cylindrical stop protrusion provided at a predetermined position on the disk to prevent the disk from rotating beyond a predetermined angle.

**8**. The hitting game machine as set forth in claim **6**, wherein the hitting member guide is curved from a vertical guide part to a horizontal guide part so that the hitting member that has been input into the hitting-member insert port and has been dropping turns in a direction toward the targets and rolls on the circular plate, wherein the vertical guide part has an S shape.

**9**. The hitting game machine as set forth in claim **6**, wherein the hitting member guide has a linear shape that allows the hitting member that has been input into the hitting-member insert port to move towards the targets, and a bottom surface of the hitting member guide along which the hitting member rolls is wavy or uneven so that a speed at which the hitting member moves downwards is reduced.

**10**. The hitting game machine as set forth in claim **6**, wherein each region of the circular plate is partitioned into sections, each of the sections having a fan shape that has a center of the circular plate as a center thereof and having one of the targets.

**11**. The hitting game machine as set forth in claim **6**, wherein the target standing unit is disposed at a position spaced apart from a circumferential outer edge of the circular plate to a height lower than the targets, wherein a height of the target standing unit is gradually increased in the direction in which the circular plate rotates, and an upper end of the target standing unit is inclined at a predetermined angle towards the center of the circular plate.

**12**. The hitting game machine as set forth in claim **6**, wherein heights of the hit surfaces of the targets are equal to each other, but widths thereof are different from each other, wherein when one of the targets rotates down, a corresponding one of different points, gifts, tickets and medals is indicated.

**13**. The hitting game machine as set forth in claim **6**, further comprising:

a control unit providing a jackpot or a bonus game when a preset one of the targets has fallen over a predetermined number of times or more.

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